Conservation Lands

Integrating Conservation and Sustainable Management in Canada's Forests

Edited by
Brenda McAfee and
Christian Malouin

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Canada

Forest Conservation Lands

Recognizing Conservation Activities across the Canadian Landscape and Assessing Their Effectiveness in the Maintenance of Biodiversity

Maintaining biodiversity throughout Canada's vast forest requires a management approach that integrates conservation and sustainable-use activities across the landscape. Protected areas, as defined by the World Conservation Union (IUCN), are the cornerstones of conservation strategies. However, the effectiveness and integrity of these protected areas depend in part on conservation activities beyond their borders such as those mandated by numerous legislative and policy mechanisms designed to protect biodiversity. In addition, activities such as those associated with specific guidelines and practices under a sustainable forest management framework can also contribute to the maintenance of biodiversity.

In the ecosystem approach presented here, lands managed to meet objectives that directly or indirectly contribute to the maintenance of biodiversity are identified as "conservation lands." These areas can be mapped and evaluated for their effectiveness in conserving biodiversity. Designated through legal or policy mechanisms, where the conservation target is determined through management objectives, four classes of conservation lands are recognized:

- wilderness areas,
- nature reserves,
- environmentally significant areas, and
- conservation management areas.

A fifth class, the conservation landscape, is a mosaic of areas that collectively maintains biodiversity across the landscape. An area is recognized as a conservation landscape when all selection criteria are fulfilled.

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Class 1 Wilderness Areas

Definition
Areas that preserve natural conditions and are without anthropogenic disturbance.

Potential Components
- Wilderness areas
- Ecological reserves
- Specific parks
- Northern forest not under timber licence and outside fire control areas

Management Priorities 1 1 1 1

Class 2 Nature Reserves

Definition
Areas that maintain significant natural and scenic features.

Potential Components
- National parks
- Provincial parks
- Park reserves

Management Priorities 1 2 1 2

Class 3 Environmentally Significant Areas

Definition
Areas that permanently protect unique habitat features fundamental for the survival of species and/or populations.

Potential Components
- Riparian zones
- Environmentally sensitive areas
- Wildlife habitat
- Conservation reserves

Management Priorities 2 2 1 2

Class 4 Conservation Management Areas

Definition
Areas that maintain or restore targeted populations.

Potential Components
- Wildlife management areas
- Sanctuaries
- Reclamation-program sites

Management Priorities 2 2 2 3

Class 5 Conservation Landscapes

Definition
Mosaic of areas that maintains biodiversity conservation across the forested landscape through the integration of conservation and sustainable use activities.

Potential Components
- Lands where management actions target biodiversity maintenance
- Lands where the nontimber productive forest contributes to biodiversity maintenance
- Lands where classes 1, 2, 3, or 4 are linked to maintain biodiversity

Management Priorities 2 2 3 4

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Management Priorities

Recreational Activities
1. Limited
2. Permitted if in-line with conservation objectives

Scientific Research and Monitoring
1. Long-term to provide benchmarks for baseline conditions
2. Permitted if in-line with conservation objectives

Resource Development
1. Not allowed
2. Limited
3. Extensive

Ecological Approach to Management
1. Maintenance of ecological processes
2. Maintenance of ecological processes with fire control
3. Focus on species and habitat objectives
4. Emulation of natural disturbances

Selection Criteria

Guidance for the recognition of a conservation landscape

Representation
- Does it contribute to conservation priorities?

Ecological Integrity
- Is it a natural forest?
- Is it sufficiently large?
- Is most of the area managed for biodiversity conservation?

Management Action
- Are local communities and indigenous people involved?
- Is it dedicated to biodiversity conservation?
- Is there a managing authority?
- Are the management objectives achievable?
- Is there an informed landowner?
- Is the dedication of the area consistent with land-use plans and policies?
- Will there be an independent assessment of effectiveness?

Connectivity
- Is there a linkage with other areas?

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Foreword

The conservation and sustainable use of Canada's forests through the maintenance of their resilience and ecological integrity has been a core national commitment of the forest community over the past decade. Specific commitments have been made under the Canadian Biodiversity Strategy and the National Forest Strategy to work toward the completion of a network of protected areas representative of Canada's forest ecosystems and to use open and meaningful public and stakeholder participation processes, sound scientific information, and traditional knowledge to ensure that social, economic, cultural, and ecological factors are considered in the establishment of protected areas.

Although the need for conservation efforts beyond the protection of landscape fragments has long been acknowledged, to date, most efforts to conserve biodiversity have been narrowly focused on the accumulation of a target percentage of land within a protected-area status. The emphasis on protected areas has limited the recognition of contributions to biodiversity conservation from other land-use categories, such as managed forests protected through legislation, policies, and industry management practices. This continuum of sites, such as riparian areas, sensitive habitats, lakes, and rugged terrain, is essential for the retention of ecological services and other forest benefits. Conservation of lands based on an ecological landscape approach to ensure connectivity and ecosystem functioning at all scales is now recognized and being implemented in some European countries, Great Britain, Australia, and elsewhere and is emerging in Canada as a restoration approach to some highly degraded ecosystems such as the Carolinian Forest. With large areas of undisturbed forest, Canada has a global opportunity to demonstrate proactive approaches to forest stewardship and conservation.

The G8 Action Programme on Forests (initiated in 1998) called on Canada to develop a consensus on the categories of protected areas, drawing on the IUCN (the World Conservation Union) protected area management categories and other classification systems. The program further suggested that Canada identify forest types not sufficiently represented within the existing network of protected areas. Protected areas are prominent in the programs of work outlined in the Convention on Biological Diversity and the proposals for action arising from the United Nations Forum on Forests. It is particularly timely to undertake a reexamination of the status of conservation lands within forested landscapes because Canada will be required to report on progress in this area over the coming year. On the international scale, the 7th Conference of the Parties to the Convention on Biological Diversity, will, for the first time, specifically focus on the status, challenges, and opportunities associated with protected areas as part of the development of a program of work. Nationally, a common and well-supported definition of forest conservation lands would be an especially useful input to the National Forest Strategy and the Conservation of Natural Heritage Program (established by the National Round Table on the Environment and the Economy in 2001). This program is championing a vision for conservation that extends connectivity across landscapes in support of the critical stewardship role of people and communities.

The 5th World Parks Congress in Durban, South Africa, 8–17 September 2003, brought together participants from around the globe to analyze major issues for conservation and examine protected area management policies for the next decade. Linkages in the Landscape/Seascape, one of seven primary streams of scrutiny, focused on the challenge of designing ecological networks that better integrate protected areas into the landscape.

Following along similar lines of thought, the Canadian Forest Service, Natural Resources Canada, has initiated work on conservation lands within Canada's forested landscape with the following phased objectives:

- To propose a method of categorizing conservation lands to facilitate planning, evaluating, and reporting on them;
- To consult with Canadian stakeholders and create consensus on a Canadian approach; and,

- To gain international support for the Canadian approach.

The XII World Forestry Congress provided an international forum for those involved in all aspects of forestry and forest science to share their thoughts on a proposed system for classifying, evaluating, and reporting on conservation lands. The additional perspectives and advice from national and international colleagues will be invaluable in guiding the further development of such a system.

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Introduction

Canada is in the enviable, yet challenging, position of being the steward of 10% of the world's forests and 30% of the boreal forests, 20% of the remaining wild areas, and 20% of the world's freshwater resources. Its eight forest regions provide habitat for about two-thirds of Canada's estimated 140 000 species with their associated biological resources. The conservation of this rich biodiversity is essential to maintain resilient forest ecosystems and to ensure a sustainable flow of forest goods and services to society (Bengtsson et al. 2003).

Canada acknowledged the importance of conserving its biodiversity when in 1992, it became one of the first industrialized countries to ratify the Convention on Biological Diversity (CBD). The three goals of the convention, the conservation of biological diversity, the sustainable use of its components, and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources, also figure prominently among the goals of the Canadian Biodiversity Strategy. The National Forest Strategy further commits to biodiversity in its first objective "to manage Canada's natural forests using an ecosystem-based approach that maintains forest health, structure, functions, composition and biodiversity."

The primary mechanism used for reporting on conservation in Canada and globally has been protected areas, *"areas of land or sea especially dedicated to the protection and maintenance of biological diversity and of natural and associated cultural resources and managed through legal or other effective means"* (IUCN 1994). However, neither the conservation value of percentage targets for protected areas nor their scientific basis have been demonstrated (Rodrigues et al. 2004). Is the establishment of protected areas sufficient to conserve biodiversity?

Protected areas tend to be situated where there is available land and political will rather than where the urgency for conservation is greatest. Generally, the most productive forests are not included in protected areas. Many protected areas were not established with conservation of biodiversity as the prime management objective and are suffering from the dominance of highly successful competing management objectives such as recreation. For example, a panel of experts has determined that the ecological integrity of Canada's national parks is threatened (Parks Canada Agency 2000). The multiple-use objectives of some protected areas may result in disruption of ecological processes such as periodic wild fire. Other protected areas may not be large enough or have connections to areas of suitable habitat to be able to support viable populations of certain species. As surrounding areas become fragmented or developed, protected areas may become landscape fragments, resulting in the disruption of predator-prey relationships or other population dynamics and the reduction of genetic diversity through population isolation. Habitat loss and fragmentation, air pollution, alien species, pesticides, and over-use are among some of the threats originating from within and outside protected areas.

International and national fora have agreed on the need to manage protected areas together with the surrounding landscape. In 1995, the 2nd Conference of the Parties to the CBD recommended an ecosystem-based approach for integrating and implementing these objectives on the landscape. In 1997, the Third International Conference on Science and Management of Protected Areas, "Linking Protected Areas with Working Landscape Conserving Biodiversity," focused on the importance of integrating protected area networks in the surrounding natural and social environment. The 7th Conference of the Parties to the CBD recognized the importance of protected areas as instruments for meeting the Convention's target of significantly reducing the rate of biodiversity loss by 2010 but pointed out that the current global system of protected areas is not sufficient to prevent global biodiversity loss. It was further acknowledged that protected areas, together with conservation, sustainable-use, and restoration initiatives in the wider landscape, are essential components of biodiversity conservation strategies.

This publication contains an abridged version of a background paper prepared for the Canadian Forest Service, Natural Resources Canada, by Wren

Resources Inc. in 2003 (pages 15–39). The background paper analyzed the status of policy, legislation, and planning mechanisms for biodiversity conservation in Canada's forests and proposed a framework for classifying, assessing, and reporting on the extent of conservation lands in Canada. The framework—the web of conservation lands—was designed to improve planning, monitoring, and reporting of forest conservation activities and to integrate conservation and sustainable management activities by including protected reserves and the surrounding matrix.

This publication also includes the proceedings of a side event at the XIIth World Forestry Congress (WFC) in Quebec City, Quebec, in September 2003 (pages 43–64). The primary objective of the side event, "A Vision for a Web of Conservation Lands across Canada's Forests," was to introduce the proposed framework and to seek international and national perspectives on it. The theme of the WFC, "Forests, Source of Life," and its 4000 participants representing 140 countries made the Congress an ideal forum to introduce the web of conservation lands.

The side event was opened by Dr. Gordon Miller, who provided the context for subsequent discussions. (His remarks now appear as a foreword to this publication.) David Neave, co-author of the background paper, then presented the web of conservation lands framework. The response to his presentation was organized around four questions that sought to determine the comprehensiveness, utility, and practicality of implementation of the framework and its compatibility with other reporting processes. Two invited speakers addressed key points for each of the questions. These presentations stimulated much lively discussion, the essence of which is also reported here.

This publication extends awareness of the conservation lands framework to a wider audience and permits you, the reader, to submit your comments to cfsinfo@nrcan.gc.ca.

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Background Paper

A Web of Conservation Lands across Canada's Forest[1]

David Neave and Erin Neave

Recognition of biodiversity conservation in Canada's forests focuses on the percentage of area under protection. However, this current system of conservation is limited primarily to parks and is not able to adequately protect biodiversity. The importance of other contributions to biodiversity conservation from a much larger network of interconnected sites comprising riparian areas, sensitive habitats, rugged terrain, noncommercial forests, and forested wetlands is beginning to gain international acceptance.

This paper reviews the status of national and international policy, legislation, and planning mechanisms for biodiversity conservation. It then identifies the web of conservation lands as an appropriate framework to plan, monitor, and report on forest conservation activities in Canada and as the basis for an ecosystem-based approach to conservation. The web links conventional protected areas with conservation and sustainable-use areas designated by policy and regulatory measures. Conservation activities occurring within sustainably managed forests and the associated large noncommercial forest areas provide the matrix of the web. The paper discusses the national and international context for a web of conservation lands and its importance in Canada's efforts to achieve and report on the many provincial/territorial, national, and international commitments to conserve biodiversity. Further, it recommends that the framework of this web of conservation lands be sufficiently robust to also provide a basis for future assessments of biodiversity objectives.

Approaches to Conserving Forest Biodiversity in Canada

A new Canadian forest management paradigm emerged in the early 1990s at the same time that the conservation of biological diversity became a key ecological concept and the focus of public concern. With the adoption of sustainable forest management practices, the conservation of biodiversity and forest ecosystem health and productivity became a cornerstone in the management of Canadian forests. The World Conservation Union (IUCN) definition of conservation as "wise use" became the overriding principle within sustainable forest management practices in Canada. This shift to a management approach focused on ecosystems paralleled Canada's leading role in the development and signing of the United Nations Convention on Biological Diversity (1993) and a number of other international environmental commitments. The subsequent Canadian Biodiversity Strategy (CBS) (1995) defined the policy agenda of achieving biodiversity conservation in all regions of Canada.

Canada's Forest Biodiversity–A Decade of Progress in Sustainable Management (Neave et al. 2002) reviewed the range of conservation initiatives occurring on forested landscapes including

- the National Forest Strategies and Canada Forest Accords (1992–1998, 1998–2003)[2];
- the development of Criteria and Indicators of Sustainable Forest Management (CCFM 2000)[3];
- the development of the Model Forest Program;
- the evaluation of forest stewardship programs leading to new conservation mechanisms in private forests;
- a comprehensive review of protected areas by the Panel on the Ecological Integrity of National Parks; and
- the development and adoption of four third-party forest certification systems to measure performance in achieving sustainable forest management.

Relative to these forest management initiatives were similar initiatives to achieve "sustainable" tourism, major changes to forest classification systems, and an array of guidelines to protect sensitive areas (such as "old-growth" forest) and species.

[1] Abridged and edited version of "The Web of Conservation Lands within Canada's Forested Landscapes: a Discussion Paper in Progress" by David Neave and Erin Neave, May 2003, prepared for Natural Resources Canada, Canadian Forest Service.

[2] More information on the National Forest Strategy and Canada Forest Accord can be found at the National Forest Strategy Coalition Web site http://nfsc.forest.ca/index_e.htm. The two strategies referred to here are the third and fourth strategies; a fifth strategy, 2003–2008, is also cited in this paper.

[3] Information on the Canadian Criteria and Indicator Task Force can be found at http://www.ccfm.org/3_e.html.

Adoption of this new paradigm led to an increase in Canada's efforts to protect forest ecosystems and species. The National Forest Strategy is proactive, based on reforestation activities and the maintenance of natural forests rather than just on protected areas. With this legacy, Canadians are proud stewards of 10% of the world's forests, 20% of the remaining wild areas, and 20% of the world's freshwater resources (NRCan 2003, p. 9).

Conservation of Canada's forests is focused on an ecosystem-based approach to ensure connectivity and ecosystem functioning at all scales. Efforts beyond the protection of landscape fragments have long been acknowledged as critical in conserving biodiversity. Over the past few decades, the forest community has supported the maintenance of ecological integrity (including biodiversity) in Canada's natural forests as is reflected in the CBS and the National Forest Strategy. From national and international perspectives, Canada's record of forest biodiversity conservation is still largely measured as the percentage of forests under a "legally" protected "park" status. However, the extent and importance of conservation efforts occurring on other lands is gradually being recognized. Such lands, comprising riparian areas and sensitive habitats, rugged terrain, noncommercial forests, and forested wetlands, are essential for the retention of ecological services and forest benefits. Constraints associated with actively managed forests also contribute to Canada's strategy for maintaining biodiversity conservation. These activities are verified through third-party audit programs of forest companies. In addition, temporal and spatial planning of forest operations helps to maintain biodiversity by mimicking natural disturbance patterns.

A common and well-supported framework to distinguish these types of forest conservation activities would be a useful tool for providing input to the National Forest Strategy, the Conservation of Natural Heritage Program (a National Roundtable on the Environment and the Economy, or NRTEE, program), and international reporting commitments. The NRTEE program champions a vision for conservation that extends connectivity across the landscape. A classification of forest conservation activities would also provide a base for incorporating many of the recommendations from the Panel on Ecological Integrity of Protected Areas dealing with connectivity, representation, and ecosystem health.

Biodiversity Conservation Mechanisms and Instruments

The development and enactment of relevant legislation, policies, and land-use plans establish a basis for the maintenance of forest biodiversity. In Canada, legislation is designed to implement government policy direction by providing the appropriate ministerial authority (and subsequent resources) to allocate the disposition of natural resources and to permit management activities. The legislative commitments to parks and protected areas and the presence of conservation measures within managed forests are the result of specific policy direction, primarily from provincial/territorial governments. Both actions have the same degree of permanence under "legislative" protection. However, conservation measures have only recently received a strong policy and legislative profile, largely because of an emerging government focus on biodiversity conservation.

The Canadian Council of Forest Ministers' endorsement of their core commitment within the Canada Forest Accord to "manage forests in a way that will maintain the biological diversity, productivity and resilience of these ecosystems"[4] is significant for the designation of future parks and for the establishment of a larger network of conservation areas. This commitment is now reflected in all provincial/territorial crown land and/or forest legislation and drives many of the legislated land-use planning processes. Legislation implementing Alberta's Policy for Management of the Eastern Slopes, for example, is a commitment to watershed management for the entire forest. Similarly, recent legislation associated with Ontario's Living Legacy has secured permanent biodiversity conservation measures beyond (and including) traditional protected areas (OMNR 1998b). The legislated requirement for regional land-use plans and forest management plans has not only ensured permanent designations of large areas of wilderness but also of watershed reserves and critical habitat areas across Canada. These broad policy commitments to biodiversity conservation, subsequently reflected in legislation, are different from but of equal importance to the conservation measures provided under

[4] From the 1998–2003 Canada Forest Accord, "Our Commitment to Action," signed by members of the Canadian forest community in May 1998 and April 2001.

operational policy guidelines governing forest management operations.

The challenge of identifying and then recognizing the extent of land contributing to biodiversity conservation is in understanding the legislative approach to the retention and use of publicly owned forested lands (see Table 1). Clearly the management of publicly owned forests in Canada is rooted in natural resource and land-use policy under acts of provincial and territorial legislatures. This legislation also provides ministers responsible for the maintenance of public land and allocation of resources with discretionary powers reflected in regulations established by Orders-in-Council and in departmental policy guidelines.

The success of implementing biodiversity conservation measures depends equally on the forest industry demonstrating sustainable forest management. Most large companies have made corporate policy commitments to biodiversity conservation and have now fully integrated sustainable management practices into their operations. Planning processes address the range of landscape, species, and genetic issues affected by timber harvesting. Forest companies have also adopted third-party auditing approaches (certification) to demonstrate their performance in achieving biodiversity conservation.

Legislation, policies, and land-use plans relevant to biodiversity conservation were identified through a literature review, direct contact with foresters and biologists within each province or territory, and an analysis of several past reviews; they are discussed below.

Legislation

The most-recognized piece of federal legislation on conservation is the Canada National Parks Act (2000, c. 32). It provides for the establishment of national parks and national historic sites throughout Canada. There are also other powerful pieces of federal legislation to conserve wildlife species across Canada, including the Canadian Environmental Assessment Act (1992, c. 37), the Fisheries Act (R.S. 1985, c. F-14), the Migratory Birds Convention Act (1994, c. 22), and the recent Species at Risk Act (2002, c. 29). The implementation of these acts across the country, however, has been inconsistent.

Provincial and territorial governments are responsible for most publicly owned forested land in Canada. Forests in most jurisdictions are protected under a public lands act that ensures government approval of any development or occupation that might affect the maintenance of the forest land base. Provincial and territorial governments direct land-use management, allocate the natural and mineral and energy resources, and protect biodiversity through appropriate legislation. Each act of a legislature has an associated suite of regulations passed by Order-in-Council that allows the responsible ministers to administer access to specific resources. To protect biodiversity specifically, there has been a proliferation of legislative initiatives (see box on page 19 for an example). Within this proliferation of legislation, provinces and territories set specific objectives for individual management units based on sustainable development criteria. The minister can designate forest sites for various forms of protection and in some provinces has established a northern boundary beyond which forest management agreements will not be allocated. The minister also requires forest companies to include biodiversity goals within forest management plans.

Policies

Government policy provides direction or guidance for decision making. In Canada, biodiversity conservation is recognized in policy commitments at international, national, and provincial/territorial levels; these include

International policy conventions/commitments supporting biodiversity conservation

- Criteria and Indicators for the Conservation and Sustainable Forest Management of Temperate and Boreal Forests (The Montréal Process) (1994)[5]
- Convention on Biological Diversity (CBD) (1993)
- Convention on the International Trade in Endangered Species of Wild Fauna and Flora (CITES) (1975)
- Convention on Wetlands (signed in Ramsar, Iran, in 1971 and thus known as the Ramsar Convention on Wetlands)

National policies

- Canadian Biodiversity Strategy (1995)
- Criteria and Indicators of Sustainable Forest Management (Canadian Council of Forest Ministers) (updated 2003)

[5] More information on the Montréal Process can be found at http://www.mpci.org/home_e.html.

Table 1. Current government and industry commitments to protect biodiversity in Canada's forests.

Commitments	Examples
Government	
International/national level agreements	Convention on Biological Diversity; National Forest Strategy; Ramsar Convention on Wetlands.
Provincial land-use policies: government-legislated commitment for long-term planning	Alberta's Policy for Resource Management of the Eastern Slopes; Cariboo-Chilcotin Land Use Plan; New Brunswick's Protected Areas Strategy; wilderness policies (roadless areas) in northern Manitoba; Ontario's Living Legacy.
Acts: long-term commitment within a framework of resource management prohibitions; ministerial authority	Canada National Parks Act; Public Lands Act (Alberta, Ontario); Crown Lands and Forests Act (New Brunswick); Environmental Assessment Act (British Columbia); Forests Act (Alberta); Wilderness Areas, Ecological Reserves and Natural Areas Act (Alberta); Wildlife Act (British Columbia).
Regulations (under each act): implementation direction	Regulations on wildlife reserves, management zones, and special area boundaries.
Guidelines/operational policies	Width of watercourse buffer zones; restrictions on pesticide use; snag retention.
Planning initiatives	Regional land-use plans; local integrated-resource management plans; forest management plans.
Industry	
Formal biodiversity policies	Biodiversity Conservation Strategy for the Weldwood Hinton Forest Management Area; Domtar's forest policy statement "A Forest for All for Always".
Long- and short-term management plans	All companies with responsibilities for forest management on public lands.
Voluntary initiatives	Additional voluntary buffers around aboriginal lands, parks, and conservation areas.
Participation in certification processes	Third-party performance audits for conservation of biological diversity: American Forest and Paper Association's Sustainable Forestry Initiative Program; Canadian Standards Association's Z809 Sustainable Forest Management System Specifications; Forest Stewardship Council International's Principles and Criteria for Forest Management.
Assumed stewardship responsibilities	Inventories of forest resources: Alpac Pulp Sales regular collection of information on ungulates; Weldwood's database on stream crossings requiring remedial action for fish passage.

British Columbia Legislation and Guidelines to Protect Biodiversity

This box lists only a portion of British Columbia's extensive legislation on biodiversity protection.

Acts of the British Columbia Legislature

Dogwood, Rhododendron and Trillium Protection Act; Ecological Reserve Act; Environment Assessment Act; Environment and Land Use Act; Environment Management Act; Fisheries Renewal Act; Fish Protection Act; Forest Act; Forest and Range Practices Code (to replace Forest Practices Code); Forest Land Reserve Act; Forest Practices Code of B.C. Act; Forest Renewal Act; Forest Stand Management Fund Act; Greenbelt Act; Heritage Conservation Act; Land Act; Land Title Act; Litter Act; Ministry of the Environment Act; Park Act; Ministry of Lands, Parks and Housing Act; Park (Regional) Act; Pesticide Control Act; Protected Areas of B.C. Act; Sustainable Environmental Fund Act; Waste Management Act; Water Act; Water Protection Act; and Wildlife Act.

Regulations

Regulations under the Forest Practices Code of British Columbia Act: Cutblock and Road Review Regulation; Forest Fire Prevention and Suppression Regulations; Forest Recreation Regulation; Forest Road Regulation; Provincial Forest Use Regulation; Silviculture Practices Regulation; Strategic Planning Regulation; and Timber Harvesting Practices Regulations including as follows: landscape unit objectives for biodiversity; retention of old-growth forest; seral stage distribution; landscape connectivity; stand structure; species composition; and spatial/temporal distribution of cut blocks.

Guidebooks

Examples of guidebooks issued under authority of the Forest Practices Code of British Columbia Act, Strategic Planning and Operational Planning Regulations: Biodiversity Guidebook (establishes objectives for landscape units and describes forest ecosystem networks and stand structures); Riparian Management Area Guidebook (sets objectives, classifies streams, wetlands, and lakes, provides guidance on roads and crossings, felling and yarding, etc, within stream wetland areas); and Silviculture Prescription Guidebook (gives specific management measures on riparian management, forest health, etc.).

Source: The British Columbia Ministry of Forests Web site provides information on the statutes, regulations, and guidebooks listed above. It can be accessed at http://www.for.gov.bc.ca/tasb/legsregs/comptoc.htm.

- Federal Policy on Land Use (1984)
- Federal Policy on Wetland Conservation (1991)
- National Forest Strategy (most recent one, 2003)
- Policy for the Management of Fish Habitat (1986)

Provincial and territorial policies

- Landscape-level planning of protected areas; for example, the protected areas commitment under Ontario's Living Legacy: Land-Use Strategy.
- Conservation reserve designations; for example, Alberta's Policy for Resource Management of the Eastern Slopes, British Columbia Grizzly Bear Conservation Strategy, and Ontario's old-growth conservation strategy.
- Aboriginal land claim settlements.
- Protection of sensitive landscape features; for example, New Brunswick Wetlands Conservation Policy.
- Designation of all forest lands and/or forest resources within designated areas of a province or territory to remain permanently in forest cover and limiting the sale of publicly owned forests; for example, Alberta's Green Area policy.

Land-Use Plans

Regional and subregional land-use plans establish a vision and set priorities for public lands within a large geographical region. They deal with zoning, resource management, and resource allocation and are a requirement under land-use planning legislation. Areas with priority and/or unique conservation values must be designated. An example of this type of land-use plan is the Vancouver Island Regional Land Use Plan. Sectoral planning, such as regional wildlife management plans, is also done to provide a basis for funding initiatives and decision making and to give strategic direction to integrated planning processes.

Local integrated resource management plans function on a finer scale than regional plans. They involve detailed management guidelines and project review processes and provide specific direction for operational and on-the-ground activities. Local plans deal with more specific designations of conservation lands and allowable disturbance and management regimes within a zone. Examples of such planning are the Cariboo-Chilcotin Land-Use

Plan, Castle Special Management Area Forest, old-growth management areas in British Columbia, community watershed plans, and coordinated access plans.

Forest management plans are developed by forest companies as a requirement under provincial legislation and are approved by the designated Minister of the Crown. These plans identify conservation areas under long-term management. Under policy direction and legislative commitments to retain biodiversity through approved forest management practices, including environmental assessment and audit processes, companies must:

Conduct an analysis of land- and resource-based information to assess timber supply. Many stands are entirely included or excluded from timber harvesting based on an assessment of their operational, environmental, productivity, and merchantability characteristics. In most parts of Canada, this initial assessment is conducted within an integrated resource management context after a land-use planning process. Although the terminology used to describe these areas within a land base is often not useful from a conservation perspective, the permanent designation of these areas greatly benefits biodiversity conservation. Examples are nonproductive areas, zones that lack commercial forest cover (such as rocky, swamp, and alpine areas); noncommercial cover, zones that lack commercial tree species; nonmerchantable areas, zones covered by timber stands not currently in demand by processing facilities; low timber productivity areas, zones that have forests with low timber-growing potential; and uneconomic areas, zones that are uneconomical to log primarily because of difficult terrain limiting access.

Conduct long-term (up to 25 years) landscape-level planning, with forest conditions projected for up to 200 years. This type of planning is required for commercial forest areas that meet regional and district land-use guidelines. Included in this planning are biodiversity goals for the forest area; identification and proposal for protection of sensitive sites, such as habitats for endangered species, and for sites with scenic or tourism values; old-growth representation; management practices for riparian buffer zones; sustainable annual allowable cut levels; and recommended silvicultural practices.

Ensure operational logging plans meet strategic objectives by preserving stand and landscape level biodiversity objectives. Forest managers are required to retain the range of habitats or land forms occurring in the forest management planning unit; preserve areas of natural forest within harvest areas to limit forest fragmentation; ensure the protection of bodies of water and hydrologic functions of watersheds; maintain species and age-class representation of forest stands; and address specific biodiversity requirements such as coarse woody debris and management of habitat for rare species.

Establish buffer areas. Forest managers are required to control the use of chemicals near bodies of water and to respect no-logging buffer areas in riparian areas. In addition, some companies have established voluntary measures, such as no-logging buffers around aboriginal land, parks, and conservation areas to maintain the ecological integrity of these areas.

International Perspective on Biodiversity Conservation Activities

Applying some form of protection to a portion of forest ecosystems is fundamental to any biodiversity conservation strategy. However, the limitations of conventional protected areas are now increasingly recognized: these areas usually have a mix of conflicting management objectives, are rarely representative of forest ecosystems, and, as isolated islands of habitat, have limited long-term value. Over the past decade, international fora have repeatedly emphasized the need to manage protected forest areas and surrounding areas for the prime objective of achieving biodiversity conservation. The resulting mosaic stretching across the landscape would link an array of interconnected areas protected by policy and legislative mechanisms.

For many countries "forest conservation and sustainable forest management have become complementary, interdependent and inseparable themes" (Kanowski et al.1999, p. 9). Countries acting on this conviction have adopted different strategies to maintain the extent of forests and range of values, including the establishment of protected areas, codes of practice, conservation agreements, and operating restrictions on logging activities. The level of protection ranges from restricting development in areas, to applying landowner-based conservation programs, to allowing industrial harvests within portions of sustainably managed forests.

The Temperate and Boreal Forest Resource Assessment (UN-FAO/ECE 2000) provides the most accurate global statistics on the status of forests indicating that 55% of forests are "undisturbed by man"; 41% are "semi-natural"; 4% are in plantations; and Canada and the Russian Federation account for 94% of the boreal and temperate forests "undisturbed by man" and 84% of the "naturalness" in "other wooded land." With two countries dominating the amount of remaining natural forests and three countries accounting for most of the plantations (Russia, United States, and Japan), multiple conservation strategies may be needed globally to maintain or restore biodiversity.

Approaches for assessing the status of the world's forests and the need for specific protection mechanisms are limited. There is only one well-developed classification system to assess the commitment and degree of success of countries in establishing a mix of protected areas.[6] The World Conservation Union (IUCN) Protected Area Categories provide the best starting point for a review of the approaches that various countries have adopted to classify protected areas. Each of the six IUCN categories of protected areas places a different degree of emphasis on conservation, recreation, and development while providing protection to biodiversity. They are described as

Category I. Strict nature reserve/wilderness area—managed (a) mainly for science or (b) mainly for wilderness
Category II. National park
Category III. Natural monument
Category IV. Habitat/species management area
Category V. Protected landscape/seascape
Category VI. Managed resource protected area

The IUCN approach has been adapted in many different ways to accommodate the objectives, interpretations, and use of different protection mechanisms by different countries. There are also a number of regional classification systems including

- Natura 2000: European Union Special Protection Areas–developed to establish a network of special protection areas to conserve biodiversity (European Commission 2003);
- Santa Marca Declaration–adopted by the first Latin America Congress on National Parks and Other Protected Areas, Santa Marca, Colombia, in 1997 to customize existing management categories within each country in a manner complementary to the IUCN;
- MCPFE Classification of Protected and Protective Forests and Other Wooded Land in Europe–a new classification system for forest protection in Europe under the Ministerial Conference on the Protection of Forests in Europe (MCPFE) focused on biodiversity and protective forest functions (MCPFE 2001) (see Table 2);
- European Forest Scorecards of the World Wildlife Fund–IUCN protected area categories used but category VI excluded (Sollander 2000); and
- Temperate and Boreal Forest Resource Assessment–designed to collect information on forests, their management and uses; incorporates elements of all IUCN categories, except category IV (UN-FAO/ECE 2000).

All of these approaches for assessing conservation status have problems with interpretation and inconsistent use of the IUCN categories and result in a great variation in the quality of information reported.

Table 2. Comparison of systems for classifying protected forests in Europe: MCPFE approach versus IUCN's.

Management objectives of MCPFE categories	IUCN categories[a]
1. Biodiversity	
1.1 No active intervention	I
1.2 Minimum intervention	II, (IV)
1.3 Conservation through active management	IV, (V)
2. Protection of landscapes and specific natural elements	III, (V, VI)
3. Protective functions	NA

[a] Equivalence of IUCN categories may vary according to the specific management objective of the forested part of each individual protected area. IUCN category III has biodiversity conservation as its primary management objective, but it fits more easily under MCPFE category 2 than 1.

Source: Adapted from MCPFE (2001).

[b] The IUCN defines a protected area as "an area of land and/or sea especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and managed through legal or other effective means."

Table 3. Rating the importance of management objectives for the IUCN protected areas: 1, primary objective; 2, secondary objective; 3, acceptable objective; and –, not acceptable.

Management objectives	IUCN categories						
	Ia	Ib	II	III	IV	V	VI
Science	1	3	2	2	2	2	3
Wilderness	2	1	2	3	3	–	2
Species and genetic diversity	1	2	1	1	1	2	1
Environmental services	2	1	1	–	1	2	1
Natural and/or cultural features	–	–	2	1	3	1	3
Tourism and/or recreation	–	2	1	1	3	1	3
Education	–	–	2	2	2	2	3
Sustainable use	–	3	3	–	2	2	1
Cultural and/or traditional attributes	–	–	–	–	–	1	2

Source: Adapted from Davey (1998)

Of particular significance to this review is the formal recognition that habitat/species management areas are managed mainly for conservation of biodiversity through management intervention and that managed resource areas are conserved for the sustainable use of natural ecosystems. Table 3 analyzes the relationships of the six protected area categories and shows how a combination of all categories is required to achieve all of the conservation objectives.

In addition, at the World Conservation Congress in 2000, the IUCN Commission on Ecosystem Management and the World Commission on Protected Areas recognized that "protected areas by themselves are not adequate to respond to the challenges of biodiversity loss and habitat destruction. We must become more flexible and in many cases be prepared to move up scale from strictly protected areas (Cats I-IV) to Categories V and VI, and from protected areas to buffer and transition zones, and into the farmland and productive landscapes" (McNeely 2001, p. 11).

The evolution of the IUCN categories of protected areas continues to challenge the conservation community, largely in the development and application of consistent, universally applicable terminology and standards. The initial categorization system in 1978 proposed 10 categories of protected areas. In 1994, this system was reduced to six categories with a clearer set of guidelines (IUCN 1994; IUCN no date). At the same time, the emphasis of protected area management was broadened with a much needed focus on utilizing Categories V and VI. "Protected areas are, to a growing extent, becoming inclusive rather than exclusive designations...The focus of protected area management is also shifting...toward protected area networks as part of a landscape or bio-regional approach to planning" (Dudley and Stolton 1998, p. 1).

The international community has recognized that different countries have adopted different strategies in working toward the shared goals of forest conservation and sustainable forest management (Kanowski et al.1999). These strategies include different mixes of protected and conservation areas and forest management regulations. Interpretation of the IUCN categories has varied from country to country and over time (Dudley and Stolton 1998; Kanowski et al.1999) and there is an active debate about the extent to which large-scale industrial activities are compatible with any category of protected area (Phillips 1998; Kanowski et al.1999; Dudley et al.1999; see also Table 3). For example, Australia has a commitment to multiple and sequential land-use activities in most of their protected areas. At the same time, the Chair of the World Commission on Protected Areas is indicating that clearcutting and plantation establishment are not compatible with any protected area designation. In Europe, hunting, ecotourism, and exotic species control are permitted in strictly protected areas (categories I and II) although silviculture is not allowed.

Canada's very conservative approach in the official designation of protected areas under IUCN categories I, II, and III is matched only by a number of developing countries, primarily in southern Africa and South America. These countries depend mainly on the designation of national parks and

international mechanisms, including biosphere reserves,[7] for biodiversity conservation measures.

The United States has a long history in forest protection with the establishment of Yellowstone, the world's first national park. With a large area of federal forests and a strong Wilderness Act, the United Sates has officially protected 14% of all forest land. Differences in defining the term protection, however, have resulted in reporting anomalies between federal agencies. The United States General Accounting Office documents far more federal land as protected than the US Forest Service does (960 000 km^2 versus 660 000 km^2). "All national forest land…not included in [IUCN] categories I through V, is included in category VI for purposes of TBFRA [Temperate and Boreal Forest Resource Assessment] 2000 and the UN list" (Kneeland and Waide 2001). This has resulted in far more category VI managed resource areas than categories I, II, and IV (wilderness, parks, and habitat areas) combined. Considerable confusion also exists over the level of protection of forests on private land. Efforts to recognize private forest owners (2.5 million people, or a quarter of all private owners) intending to retain their forests without logging and the breadth of conservation easements across the country have yet to be successfully incorporated in any survey (Birch 1996).

A recent gap analysis of protected forest areas in Europe (European Forests and Protected Areas: Gap Analysis) indicated that 56% of Europe's forest cover has been lost (UNEP 2004). Of the remainder (3.3 million km^2), there are approximately 6% in protected areas (IUCN categories I–IV). There is a great difference in strategies between southern Europe and Russia. Nearly all (95%) of Europe's protected forest areas comprise fragments of less than 10 km^2 and are found in southern Europe. In northern European Russia, assessments have shown that undeveloped parts of the taiga, of which forest land is sometimes no more than 20–30% of the total area, are relatively "small and rapidly diminishing" (Yaroshenko et al. 2001). The current protected area strategy is to "protect" the total area of this undisturbed taiga regime–largely bog-dominated landscapes with noncommercial forests. Russia's strategy is very different from more southern European countries, most of which have declared all their forests protected under the IUCN protected area classification. Although the IUCN system is designed to accommodate modified landscapes, 10 European countries have utilized category VI extensively. For example, all of Germany's public forests and 40% of all of its private forests are included in category VI. This southern European strategy is under increasing scrutiny from European conservation agencies and the working group established by MCPFE after the 1996–1999 COST E4[8] Action: Forest Reserve Research Network results (European Commission and COST 2000). Their analysis showed limited "strictly protected forest areas" of 1.6% of the remaining forest area, excluding Russia, compared with the total claimed protected forest area.

Figure 1 shows the percent of forest area included in strictly protected areas in comparison with other categories of protected forest areas in 26 European countries and the European part of Russia. Figure 2 shows the relationship between the extent of natural forests and the degree of protection afforded to these forests in Canada and southern Europe. It is important to recognize that the degree of protection for Canada shown in this figure represents only those areas in IUCN categories I (strict nature reserves or wilderness areas) and II (national parks). This relationship also reflects the level of stewardship of publicly and privately owned forest land. The limited amount of strictly protected area identified for Canada may largely be a function of the perceived need for formal protection mechanisms to conserve biodiversity. Countries with a low or decreased amount of forest cover, often in a highly degraded and fragmented state, have the most immediate concern for conservation; this is expressed in their protection designation for all forests. The need to protect remnant forests through legislative mechanisms reflects the limited amount of success that countries have

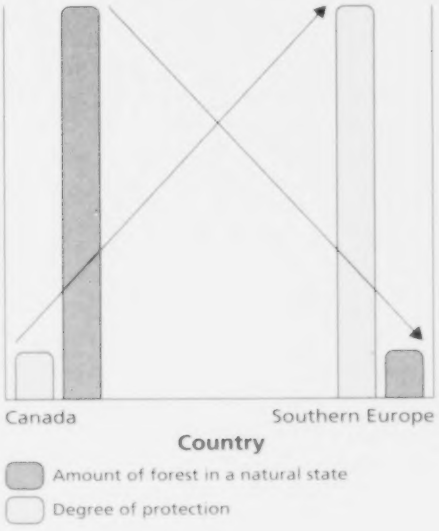
[7] Internationally recognized areas of terrestrial and coastal ecosystems that integrate three basic functions in their management: conservation of biodiversity, human and economic development, and logistic support for research and monitoring. Nominated by national governments, they remain under the jurisdiction of the states where they are located. Together, they form the World Network of Biospheres.

[8] COST is an acronym for "European cooperation in the field of scientific and technical research." Membership in this intergovernmental framework comprises mainly but not exclusively European countries. COST works through "Actions," usually given alphanumeric codes (e.g., E4).

Figure 1. **Protected forest areas in 26 European countries according to various man-agement objectives.**

Source: Parviainen and Frank 2003, reproduced by permission of the authors.

Figure 2. **Reverse relationship between the extent of forest in a natural state and the degree of protection.**



demonstrated in exercising their custodial responsibilities to retain natural forests.

Although most countries have adopted policies to retain forest cover and achieve sustainable forest management, the degree of success in the implementation of these policies varies. However, the need for a holistic approach, considering entire ecosystems and landscapes, to maintain biodiversity and protect natural forest functions seems to be accepted at political and scientific levels worldwide. The IUCN strongly encourages countries to adopt its protection categories, and particularly the more flexible categories V and VI. The IUCN is also beginning to recognize integrated programs based on land-use planning and defined management objectives such as Australia's regional forest agreements.

In Australia, the National Forest Policy Statement provided for a series of regional forest agreements (see Keenan, this publication). These agreements are a model for Canada to consider because of their basis in national policy and their implementation through an integrated assessment and planning process for all forest regions of the country. Each Australian state and territory has its own legislation and nomenclature, as do Canadian provinces and territories; and in both countries, the result is a variety of designations for biodiversity conservation. Although only 36% of Australia's original forest cover remains, and 70% of these forests are privately owned, about 75% of the crown-owned forests are protected from harvest through policy and legislation. The Australian approach, apparently well recognized and accepted within the IUCN protected area program, builds on a mix of "protected" area designations and other "conservation" areas.

Success in implementing broader biodiversity conservation commitments, however, has been hindered by the ongoing debate surrounding protection mechanisms. The development of new protected area designations (for example, the MCPFE classification), various criteria and indicators (for example, the Montréal Process), different databases (for example, the World Conservation Monitoring

Centre Protected Areas Database), and a range of objectives for protected areas (for example, the World Wildlife Fund's "Strictly" Protected Forest Area Program), as well as interpretation of protected area terminology, have led to confusion and inconsistent data and are of limited value in enhancing biodiversity conservation.

The 1994 Guidelines for the IUCN Protected Area Management Categories provide useful direction for a Canadian approach to recognize biodiversity conservation initiatives. Nonetheless, Canadian success in adopting the IUCN program and using all six categories appears limited compared with efforts by other forested countries to do so. Canada is unique in that the potential exists to both maintain the natural integrity of its forests and build a comprehensive mix of conservation areas. However, unlike other countries, it has not developed a policy and land-use planning base to integrate the variety of existing conservation mechanisms. These mechanisms, when collectively used, implement sustainable forest management practices that incorporate biodiversity conservation objectives as a priority. Although Canada needs to take a more proactive approach to achieving recognition of its success in conservation programming, it also has to address issues similar to other countries. These issues include

- ensuring wilderness and ecological reserves are part of all forest ecosystems (in commercial as well as noncommercial forest areas);
- retaining the ecological integrity of protected areas by limiting practices that fragment them, such as some fire suppression efforts;
- providing adequate custodial and/or management responsibilities and resources to all conservation lands through more progressive partnerships;
- recognizing the importance of tenure systems (rights and responsibilities) that can favor or degrade forests; and
- providing realistic valuation of all forest goods and services particularly to local communities.

Framework for the Web of Conservation Lands

The international community has recognized that countries (and other jurisdictions within a country) have adopted different strategies in working towards the shared goal of forest conservation and sustainable forest management (Kanowski et al. 1999). Most strategies have focused on establishing protected areas and, similar to the IUCN classification of protected areas, have emphasized in their classification the differences in priorities for recreational, conservation, or other resource development. In Canada, a more direct approach to recognizing biodiversity conservation activities appears warranted because

- most forests in Canada are on publicly owned land;
- this public land is legally defined as permanent forest land;
- these forests are already largely managed under integrated resource and/or land-use planning processes;
- a suite of conservation mechanisms (policy, legislation, planning) is in place that ensures the maintenance of biodiversity in managed forest areas; and
- forests allocated to commercial use are managed under a sustainable forest and/or resource management concept often subject to independent third-party audits.

Biodiversity conservation is a priority across all forest landscapes in Canada, but greater clarity and a common understanding of all protection and/or conservation mechanisms is required. The existing mechanisms designed solely to maintain biodiversity and the ecological integrity of forests focus on limiting the extent of human disturbance. The diagram in the brochure provided in the back of this publication describes a system to classify lands based on management priorities contributing to the maintenance of biodiversity. This system also applies to the management and assessment of these lands.

The framework for a web of conservation lands includes both conventional protected areas and lands beyond protected areas where policy or regulatory initiatives call for conservation measures. It integrates conservation and sustainable use on the same landscape. This approach is similar to that referred to by some authors as "off-reserve conservation" (Binning 1997; Kanowski et al. 1999).

Conservation lands are managed to meet objectives that directly or indirectly contribute to the maintenance of biodiversity. These lands are identifiable on the landscape and can be measured and evaluated for their effectiveness in conserving

Table 4. A framework grouping the various federal and provincial/territorial designations for biodiversity conservation in Canada under a set of generic terms and objectives based on the extent of human disturbances.

Conservation land class	Management priorities	Potential components
1 **Wilderness areas** Preserve natural conditions and are without anthropogenic disturbances	- Maintenance of ecological processes including natural fire disturbance. - Provision of areas for long-term monitoring and research.	Wilderness areas, ecological reserves, specific parks, northern forests not under timber license and outside fire control areas.
2 **Nature reserves** Maintain significant natural and scenic features	- Conservation efforts to maintain ecological processes although extensive fire control is practiced in southern Canada. - Recreational activities permitted that do not conflict with the retention of biodiversity and/or the maintenance of natural/ecological processes.	National parks, provincial parks, park reserves.
3 **Environmentally significant areas** Permanently protect unique habitat features fundamental for the survival of species and/or populations	- Maintenance of biodiversity values paramount, with limited recreational and resource development permitted.	Riparian zones, environmentally sensitive areas, wildlife habitats, conservation reserves.
4 **Conservation management areas** Maintain or restore targeted populations	- Protection through intensive management measures.	Wildlife management areas, sanctuaries, reclamation-program sites.
5 **Conservation landscapes** Maintain biodiversity conservation across the forested landscape through the integration of conservation and sustainable-use activities in a **mosaic of areas**	- Large forests normally under extensive recreational and resource development. - Natural species and age representation (seral and/or habitat stages) maintained across the landscape. - Forests managed to mimic disturbance in absence of fire and minimize fragmentation. - Often includes a configuration of classes 1, 2, 3, or 4. - Management of the result of effective regional and operational planning, adequate information, complete suite of biodiversity objectives, and an evaluation process based on an appropriate monitoring program associated with the area.	Lands where management actions target biodiversity maintenance, where the non-timber productive forest contributes to biodiversity maintenance, or where classes 1, 2, 3, or 4 are linked to maintain biodiversity.

biodiversity. The proposed framework recognizes a web of conservation measures comprising five classes: wilderness areas, nature reserves, environmentally significant areas, conservation management areas, and conservation landscapes. For more information, see Table 4.

In the web of conservation lands, *conservation* and *sustainable use* are defined as follows:

Conservation: setting aside (or managing differently) parcels of land within a planning area including protected areas such as parks, wilderness areas, and ecological reserves and other areas such as riparian zones, environmentally sensitive areas, wildlife habitat conservation areas, and wildlife management areas.

Sustainable use: specific management activities that occur within the managed forest including guidelines for retention of wildlife trees, snags, and coarse woody debris during harvesting, spatial and temporal considerations with regard to species composition and age-class distribution, and considerations such as fragmentation and connectivity.

Conservation lands are designated through an array of legislative and policy initiatives. Classes 1–4 include conventional protected areas (for example, parks) and other lands dedicated to conservation (for example, wildlife management areas and environmentally sensitive areas). Class 5, the conservation landscape, comprises conservation lands in any of the other classes plus the forest matrix linking them. The extensive areas of noncommercial forests within existing forest management areas as well as north of the commercial zone in Canada constitute an important part of this matrix, but their role in biodiversity conservation remains undefined. The importance of appropriate silvicultural prescriptions to maintain biodiversity in the commercial forests subject to harvesting is also considered in the recognition of a conservation landscape.

Integration of conservation and sustainable-use measures is needed to ensure the functioning of ecological processes such as wildfire; to limit recreational as well as commercial and resource development; to retain critical and/or sensitive sites and equally to protect species outside of them; and to develop "floating reserves" that retain large patches of older forests. Additionally, this integration addresses the dilemma that Canada's traditional protected areas were often not established to conserve biodiversity.

This framework of conservation designations is appropriate for categorizing current government and private agency strategies for management and use of these lands to achieve conservation at a landscape scale. Accounting for only 6% of Canada's forests, private forests are nevertheless responsible for 20% of Canada's wood production. These private woodlots are also the habitat for many of the rare and endangered plant and animal species found in Canada's southern forests. In addition, a disproportionate amount of ungulate winter range, salmon habitat, and colonial nesting bird habitat is associated with private land ownership.

The focus of biodiversity conservation has primarily been in southern commercial forests because this is where the greatest number of species at risk are found and where opportunities for conservation are limited by urban development. A large proportion of Canada's forests are north of the commercial forest zone and are still predominantly in a wilderness state. For this forest area, the Canadian Parks and Wilderness Society has proposed a "reverse matrix" model in which wilderness forms the matrix, and human communities and industrial activities exist as islands connected by transportation routes (Schneider 2001). The web of conservation lands framework would also be compatible with this model.

Principles to guide the inclusion and recognition of lands for their biodiversity conservation value are an essential component of any conservation strategy. The IUCN has developed eligibility criteria for the purpose of screening potential lands to be included for IUCN protected status (IUCN 1994; IUCN no date). The list below is a compilation of guidelines for selecting protected area management categories that have been recommended by the IUCN or that are based on the Australian process (WCPA 2000), with some interpretation from a Canadian perspective (this review). These key considerations and underlying principles can equally serve as guidance for a Canadian conservation land approach. The essence of this list has been summarized as selection criteria guidance for the recognition of a conservation landscape, or class 5 (see brochure inserted in back pocket).

1. *The area must be a natural area or an area with natural features.* Australia has defined "natural areas" as "those areas which largely retain the landscape and ecosystem character that existed prior to European settlement" (WCPA 2000).

2. *The area must build a variety of local community partnerships and in particular engage aboriginal peoples.* Recent international direction reinforces "the need to involve indigenous people in the management of all protected area categories" (WCPA 2000). Traditional activities by aboriginal communities (such as trapping, hunting, and fishing) are acceptable for all IUCN categories as long as they are consistent with management objectives.

3. *The area must be particularly or chiefly dedicated to the protection and maintenance of biological diversity.* The key is not the form of legal protection, but that the designated management authority be capable of and accountable for achieving specific management objectives. This prime objective has largely been met by dedicating areas for the purpose of the protection and maintenance of biological diversity through

- legally defined areas such as parks and nature reserves;
- the protection of cultural areas within a natural context;
- the assembly of multiple legislation and planning authorities into one authority where the principal objective is the protection and maintenance of biological diversity (for example, a watershed authority); and
- a dedicated area where the principal objective is not directly related to the maintenance of biodiversity and/or natural values but indirectly ensures adequate protection (for example, state forests subject to commercial timber extraction; crown leases).

4. *The area must be effectively established by a government or private interest, and a managing authority, specific objectives, and management guidelines must be identified.* Areas included in the guidelines are those

- whose use cannot be allocated except through parliamentary process;
- subject to a protective covenant on land titles or within wildlife conservation legislation;
- under a management plan developed under the provisions of an act of law that designates areas with the principal objective of biodiversity conservation;
- within an indigenous community, subject to long-term legally enforceable conservation direction; and
- privately owned lands managed by an appropriately constituted nongovernmental conservation organization.

5. *The size of the area must reflect the extent of land or water needed to accomplish the purpose of management* (that is, maintain species and ecological processes). A series of reserves (to conserve remnant sites) can be assembled to accomplish the principal objective. The coordinated management of adjacent areas can also achieve this criterion.

6. *At least three-quarters and preferably more of the area must be managed for the primary purpose of biological conservation; the management of the remaining area must not conflict with the primary purpose.*

7. *The designated management authority must be capable of achieving the management objectives within some type of legislative framework or management plan.*

8. *The ownership of land must be compatible with the achievement of the management objectives.* This includes

- land of enduring tenure such as crown land, perpetual lease, and freehold land held by a government, incorporated public utility, or public company;
- freehold, crown, and leasehold land subject to protective covenant for title or agreement under the provisions of land title legislation (with changes subject to a minister or director in consultation with conservation authorities); and
- an indigenous community with a long-term, legally enforceable management regime.

Freehold, crown, or leasehold land held by an individual or private company not subject to a legal instrument or legislation requiring determination by a minister (or director) for planning the environment or through a parliamentary process would not be eligible.

9. *The area may be contiguous with or contained within other areas in different categories.* Large areas often encompass a hierarchy of protection and may include "buffer" zones.

10. *Planning and management of an area must be incorporated within regional planning and supported by policies adapted for wider areas* (such as regional and environmental plans).

11. *The area must be effectively monitored.* The need for independent assessment to verify

Conservation Lands in Canada's Forests: Case Studies

To demonstrate the type and extent of conservation lands at the provincial, regional, and operational planning and management levels and to provide a greater level of detail on the types of activities contributing to biodiversity conservation within forest management areas, six case studies were prepared. A summary of findings is presented below.

1. Ontario's forested land base demonstrates that crown land under forest management comprises 31% of all forests and 37% of all timber-productive forest land in the province. Existing parks and conservation reserves cover 12% of the planning area, while reserves protecting other values account for approximately 10%. —OMNR (1998b)
2. Algonquin Provincial Park is perhaps the best example of sustainable forest management through integrated land-use planning in Canada. Forest harvest is excluded from 45.6% of its area. Development and access zones account for 3.1% of the park, and 51.0% of them are in the forest management area.—OMNR (1998a)
3. The Mazinaw-Lanark Forest Management Unit is a mix of private and publicly owned lands. The total area of conservation lands is 17.9% of the land base.—OMNR (2001)
4. A study by Domtar Inc. demonstrates the variability in the application of a selection of forest management guidelines for biodiversity values over the past 10 years. The guidelines affected forest management on 10.8–16.0% of the areas during this study.—Domtar (2001)
5. A 2002 collaborative study by the Ontario Ministry of Natural Resources, the Canadian Forest Service, the Canadian Ecology Centre, and Tembec in northern Ontario demonstrates that 45% of the forest in the north study area and 68% in the south are under some form of policy and legislative forest management constraint. This includes areas with some constraints (some harvest allowed) and full constraint (no harvest allowed). In the north, an average of 7.7% of the commercial forest area was under full constraint and in the south, 11.5%.—Baldwin et al. (2002)
6. An assessment by Weyerhaeuser Canada across their operations in the boreal forest shows that 35.9% of the land is not considered for harvest because it is nonforested, nonproductive, low in productivity, inoperable, or inaccessible and another 7.5% is under policy reserve.—Diane Roddy, Weyerhaeuser Canada, personal communication (2003)

that biodiversity has been maintained is emerging as an eligibility criterion.

The adoption of these selection criteria will provide a comprehensive and practical conservation framework for Canada; it addresses landscape and species biodiversity conservation, utilizes existing forest conservation and/or management mechanisms, and retains the integrity of the existing programs of other agencies.

Linking the Web's Framework

As mentioned previously, the 1994 Guidelines for the IUCN Protected Area Management Categories provide useful direction for a Canadian approach to biodiversity conservation. That national focus has been limited to category II (national parks) areas may be a reflection of the provincial and territorial constitutional responsibility for forested land and its associated biological resources. The failure to adopt the scope of the IUCN program may also be due to the great variation among provinces and territories in the types of conservation initiatives to protect biodiversity (and their nomenclature) within a sustainable forest management approach. Nevertheless, there is a growing realization that biodiversity conservation efforts in Canada far exceed just the establishment of national parks. The web of lands dedicated to biodiversity conservation within Canadian forests is immense.

Canada has the opportunity to more clearly recognize its web of conservation areas. The G8 directed Canada to better define conservation categories (G8 2002) and the IUCN is currently encouraging discussions on the interpretation of its categories. A workshop at the World Parks Congress (2003) presented preliminary results from the Speaking a Common Language project[9] being carried out by Cardiff University in Wales and Equilibrium Consultants (Bristol and Machynlleth, UK) in collaboration with the IUCN and the UN Environment Programme's World Conservation Monitoring Centre. The workshop confirmed that

[9] See Bishop et al. (2004) for the now published report on this project.

Table 5. Mechanisms used to manage protected areas in the Northwest Territories (NWT) matched to IUCN protected area categories.

IUCN protection category	NWT protected area mechanism (**N** = nonlegislated tool)	Comments
Ia Strict nature reserve Scientific research	None currently available	NWT lacks specific legislation for creation of nature reserves strictly for scientific research. Most Canadian jurisdictions, including the Yukon Territory, can create ecological reserves for this purpose.
Ib Wilderness area Wilderness preservation	Territorial wildlife (game) sanctuary combined with a DIAND[a] land withdrawal under the Territorial Lands Act.	The Thelon Wildlife Sanctuary is the only strictly wilderness area in the NWT. No new sanctuaries can be created using this combination of mechanisms.
II National park Ecological integrity Public use and enjoyment	National park and park reserve National marine conservation area Biosphere Reserve (core area) **N** World Heritage Site **N**	Powerful tools for providing long-term protection, but the need for natural values to be of national significance limits their usefulness. Status as a Biosphere Reserve or World Heritage Site adds global recognition to legislated protected areas.
III Natural monument Specific natural and cultural features protection	National historic park and site Territorial historic park Territorial natural environment park	National historic parks fit well into this category. Territorial natural environment parks will fit if their management is aimed at protecting specific features.
IV Habitat or species management area* Wildlife species or habitat protection	*National Wildlife Area *Marine Wildlife Area *Migratory Bird Sanctuary Critical Wildlife Area Caribou Protection Measures Special Management Area Ramsar site **N** Biosphere Reserve (core area) **N**	A wide variety of land uses may occur in these areas as long as they do not threaten the wildlife values the areas are meant to protect. Special conditions on land-use permits are often applied only on a seasonal basis during critical times in the life cycle of the protected species. Biosphere Reserve or Ramsar designations can enhance public awareness and sound management of a site.
V Protected landscape/ seascape Protection for traditional human interactions with land and water Recreation	No specific legislation is currently available although the designation as a national historic park may apply. Canadian Heritage River **N**	This category applies to the protection of traditional interactions of aboriginal people with the land and water (e.g., the kind of protection proposed for Scented Grass Hills and Grizzly Bear Mountain on Great Bear Lake). The Canadian Heritage River System emphasizes the importance of protecting human-environment interactions.
VI Managed resource protection area Sustainable resource use	Marine Protected Area Area Development Zone Travel Restricted Area and Zone Forest Management Area Biosphere Reserve (buffer zone) **N** Wildlife Management Area	Although the focus of these mechanisms is to promote managed use of resources, all of them can be used to protect key areas or features. Another advantage is that they can be applied on a short- or long-term basis. No one controls access to subsurface resources.

[a] DIAND = Department of Indian Affairs and Northern Development (Canada)

* Asterisk indicates that habitat rather than species is protected.

Source: NWT Protected Areas Strategy Advisory Committee (1999).

Table 6. Biodiversity conservation areas and/or mechanisms used in Ontario and how they relate to the IUCN protected areas and/or categories.

Areas and/or mechanisms in Ontario	Degree of protection	IUCN protected area category							No equivalent IUCN category
		Ia	Ib	II	III	IV	V	VI	
International									
Ramsar Convention sites	Full and partial					●			
National									
Migratory bird santuaries	Full and partial	●		●	●	●			●
National Wildlife Areas	Full	●	●	●	●	●			
Provincial									
Conservation reserves	Full	●	●	●	●				
Provincially significant wetlands	Full and partial								●
Areas of natural and scientific interest	Partial								●
Wildlife management areas	Full and partial					●			●
Crown game preserves	Partial								●
Fish sanctuaries	Partial								●
Forest management reserves	Partial and none								●
Restricted access areas	None								●

Source: Adapted from Paleczny et al. 2002.

there are substantial areas of uncertainty surrounding the practical implementation and use of the protected areas categories. The objective of the project is to recommend guidance, translation, and training that could be associated with the guidelines.

Canada is in a position to not only define a broader forest biodiversity conservation strategy, but like Australia, fully utilize the existing IUCN categories. The proposed conservation lands framework is designed to include the complete range of IUCN management categories and make greater use of the more flexible categories (V and VI).

Land management practices in Canada have been compared with the IUCN protected area framework; in some cases, the six-category structure has been expanded or the framework used for different purposes. One such comparison was made as part of the Northwest Territories Protected Areas Strategy (NWT Protected Areas Strategy Advisory Committee 1999). A conservative approach for categorizing existing protection mechanisms with IUCN categories was developed (see Table 5).

In Ontario, a review of 40 existing protection mechanisms by Paleczny et al. (2002) attempted to link conservation efforts to IUCN protected area categories. Table 6, an excerpt from their preliminary evaluation of protected areas mechanisms in Ontario, demonstrates the degree to which conservation mechanisms in Ontario relate to the IUCN protected area categories. Several provincial conservation mechanisms do not relate to any of the IUCN categories, while the provincial conservation reserves and the national wildlife areas fit in several categories.

In 1998, the Canadian Forest Inventory Committee proposed three additional categories to those of the IUCN (CFIC 1998). These categories recognize the protection of natural diversity in sustainable timber management areas and in northern forests wilderness areas. The three additional categories are as follows:

Category VII. Sustainable timber management areas: Areas managed mainly for sustainable timber production with some formal protection of natural ecosystem components.

Category VIII. De facto wildland: Areas with little or no human intervention in which no formal protection of ecosystem components is provided.

Category IX. Not protected.

This system was tested with several model forests. Although it allows for a more comprehensive classification system of forested lands, there has been limited use of the concept. Its proposed definition of protected areas as "areas of land and/or water which, to varying degrees, protect

Table 7. Management objectives for IUCN categories versus those for forest management categories developed by Dudley et al. (1999): 1, primary objective; 2, secondary objective; and 3, acceptable objective.

Category	Management objective		
	Biodiversity conservation	Environmental services[a]	Sustainable use of natural ecosystems
IUCN			
Ia. Nature reserve	1	2	–
Ib. Wilderness	2	1	3
II. National park	1	1	3
III. Natural monument	1	–	–
IV. Habitat/species management area	1	1	2
V. Protected landscape/seascape	2	2	2
VI. Managed resource protected area	1	1	1
Dudley et al.			
A. Managed for resource protection	3	1	2
B. Managed for community benefit	2	2	2
C. Reserved for future use	2	2	2
D. Multiple-use management	3	2	3
E. Intensive-use management	3	3	–

[a] Such as soil protection and avalanche control.

Source: Adapted from Dudley et al. (1999).

and maintain biological diversity, and natural and protected cultural resources, through formal policy or regulation or informal, passive means" is limited. Although it may be an appropriate classification for inventory programs to assess northern forests and sustainable timber production, it does not recognize the extensive conservation activities throughout forests.

The proposed grouping by the Canadian Forest Inventory Committee is very different from the international proposal by Dudley et al. (1999) for "areas of forest and associated lands primarily managed for resource protection and sustainable use." The categories are described below.

A. Managed for resource protection: Area of forest protected to provide a range of environmental services, such as soil and watershed protection, avalanche control, and fire and flood buffer zones.

B. Managed for community benefit: Area of forest and associated lands used primarily to meet community needs, such as wood gathering, nontimber forest products, and subsistence needs.

C. Reserved for future use: Area of forest reserved for potential future resource needs.

D. Managed for multiple use: Landscape area, usually including forests, agricultural lands, and settlements, that is as a whole sustainably managed for a range of community and industrial uses.

E. Managed for industrial and intensive forestry: Area of forest managed primarily for sustainable resource production, such as production and management of timber, nontimber forest products, agriculture, mining, and energy.

The alignment of management objectives with the five proposed categories and those of the IUCN protected area categories show that biodiversity conservation within the categories proposed by Dudley et al. (1999) is a secondary aim (Table 7).

The Fundy Model Forest, New Brunswick, did two separate analyses to assess protected area representation by community and age class (Sahanatien and Allen 2000). The first analysis classified categories of protected areas according to IUCN protection categories I to VI and assessed for representation of these categories. The IUCN classification was only used on sites with permanent, legal protection. The assessment showed that 5.3% of the total Fundy Model Forest land base[10] could be

[10] Bodies of water, such as ponds and rivers, were excluded.

Table 8. IUCN protected areas represented within the Fundy Model Forest (FMF).

FMF entity–IUCN protected area category	Land area (km^2)	% of FMF land base
Doreen F. Shippee Natural Area–III	0.338	0.01
Legal reserves–Ia	1.375	0.03
Fundy National Park–II	204.138	4.94
Conservation areas (Pt. Wolfe R. Gorge, McManus Hill)–III	12.323	0.29
Conservation areas (Pt. Wolfe R.Gorge–FNP[a] overlap)–III	0.057	0.001
Total IUCN protected status	218.232	5.28

[a]FNP = Fundy National Park.

Source: Sahanatien and Allen (2000).

Table 9. Forest management categories developed by Dudley et al. 1999 represented within the Fundy Model Forest (FMF).

FMF entity–Dudley et al. category[a]	Land area (km^2)	% of FMF land base
Stream buffers–A	295.858	7.16
Mature coniferous forest–C	29.149	0.71
Mature coniferous forest, stream buffers–C	0.261	0.006
FMF unique sites–C	12.445	0.30
FMF unique sites, stream buffers–A	0.345	0.008
FMF unique sites, mature coniferous forests–C	4.700	0.11
Deer wintering areas, JDI*–B	26.763	0.65
Deer wintering areas, JDI*, stream buffers–A	2.741	0.07
Deer wintering areas, Crown–B	14.568	0.35
Deer wintering areas, Crown, stream buffers–A	5.868	0.14
Conservation stewardship program–B	3.020	0.07
Conservation stewardship program, stream buffers–A	0.125	0.003
Conservation stewardship program, FMF unique sites–B	0.008	0.00
Conservation stewardship program, FMF unique sites, stream–A	0.001	0.00
Total forest management category status	395.852	9.59

[a] Dudley et al.'s categories represented here are A, managed for resource protection; B, managed for community benefit; and C, reserved for future use.

* JDI = J.D. Irving Ltd. lands.

Source: Sahanatien and Allen (2000).

classified under IUCN protected categories. This included natural areas, legal reserves, Fundy National Park, and conservation areas (see Table 8).

The second analysis used the five forest management categories developed by Dudley et al. 1999. Table 9 shows how the land area of Fundy Model Forest fits into the relevant Dudley et al. categories. These categories of protection account for 9.6% of the Fundy Model Forest land area. These two analyses further support the need for a Canadian approach to conservation focused on maintaining biodiversity across the landscape and the appropriate utilization of IUCN categories IV and VI.

Working with the Web of Conservation Lands

An ecosystem-based approach to management attempts to maintain or restore the composition, structure, and processes of entire forest ecosystems rather than their individual components (Meffe and Carroll 1997; Grumbine 1994). From a management perspective, this requires objectives to maintain

- the full spectrum of major ecosystem types (representation);
- natural disturbance regimes (ecological integrity); and
- links between natural areas (connectivity).

In addition, successful implementation of ecosystem-based management requires designation of a management authority to coordinate the collaborative arrangements and partnerships that are needed to realize these management objectives.

Maintaining and monitoring the habitat and ecosystem processes that species require for their existence is referred to as a coarse-filter approach to biodiversity conservation. With respect to management, the objective would be to ensure that all major ecosystem types are included within a system of protected areas. Within protected area systems, emphasis has primarily been on the extent of forest that needs to be protected rather than on the representativeness. Globally and within Canada, there are various opinions on how to achieve representativeness. For example, the World Wildlife Fund and IUCN suggest that 10% of the world's forests need protection; the Australia Regional Forest Agreement (Kirkpatrick 1999) sets the target of including 15% of pre-1750 Australian forests in conservation reserves; and the Subcommittee on the Boreal Forest (Senate of Canada 1999) calls for protection of 20% of Canada's existing boreal forests.

The second objective of ecosystem-based management, ecological integrity, includes mimicking and/or maintaining natural disturbance regimes. Achieving this objective requires that the future structure, pattern, and ultimately biodiversity within each forest are defined. With the use of GIS (geographic information system), forest managers can assess and monitor spatial indices of forest cover, a requirement within the *Forest Management Planning Manual for Ontario's Crown Forest* (OMNR 2004). Analysis of forest cover, spatial patterns, patchiness, spatial complexity, amount of interior and edge, and age classes based on the history of forest fire and harvests provide a comprehensive view of spatial land cover patterns. This is fundamental to assessing the success of habitat supply models now instituted in many regions of Canada. Although all provinces/territories have general objectives such as to ensure no loss of ecological representation and to maintain genetic diversity within species, measurable biodiversity objectives are now only starting to emerge. The following are some examples of the types of biodiversity objectives that have been developed to maintain ecological integrity within forest landscapes:

Alberta (Alberta Timber Harvest Planning and Operating Ground Rules [ASRD 1994])

- Minimum of 10% of gross productive forest land base of each forest management unit to be managed as mature or overmature forest.
- Live trees and snags to be retained at 8/ha in clumps.
- Woody debris greater than 8 cm in material to be in piles 50 m apart.
- Alpac Pulp Sales and Daishowa-Marubeni International to retain 8% old-growth.

Great Lakes (Great Lakes Remedial Action Plan Program [Environment Canada 2004])

- 10% of a watershed and 6% of any subwatershed to be composed of wetlands.
- Minimum 30% in forest cover, with at least one 200-ha patch, 500 m wide.
- 10% of watershed in forest cover to be more than 100 m from the forest edge and 5% more than 200 m from the edge.
- Total suspended sediment concentrations to be less than 25 mg/l.

New Brunswick (Non-timber Management Objectives under the Crown Lands and Forest Act [NB DNR 2003])

- Minimum of 12% of each vegetative community retained.
- 10% of spruce-fir habitats maintained in mature condition with minimum patch size of 375-ha dispersed over an area of less than 500 ha.
- 20-ha patches of tolerant hardwoods retained as barred owl habitat within 27-ha areas and a minimum distance of 4 km.

Ontario (Conservation Strategy for Old-Growth Red and White Pine Forest Ecosystems in Ontario, [OMNR 1995])

- All red and white pine maintained at current levels at a minimum.

An analysis in New Brunswick indicated that objectives for ecological integrity are achievable but will reduce commercial harvests by about 19%. (Jaakko Pöyry Consulting 2002).

Applying the third objective, connectivity, to forests is less evident. "Concepts such as fragmentation, isolation, corridors and interiors, for example, were formulated specifically for heavily settled farmed landscapes" (Perera and Baldwin 2001). Forests in Canada are not fragmented in a traditional sense because they are a mosaic of different cover types and age classes. This is particularly evident in disturbance-based boreal forests, where the return of nonforest islands to forested lands created

an ever-shifting mosaic of disturbed patches (Perera and Baldwin 2001). Although there is only limited evidence that conventional movement corridors do in fact provide connectivity in rural landscapes (Beier and Noss 1998), a profusion of connectivity objectives have evolved as shown by the examples below:

Alberta (Alberta Timber Harvest Planning and Operating Ground Rules [ASRD 1994])

- Specific standards on buffer sizes along creeks and rivers.
- In cutblocks, the distance to winter hiding cover not to exceed 200 m.
- Specific widths for wildlife travel corridors.

Great Lakes (Great Lakes Remedial Action Plan Program [Environment Canada 2004])

- Streams to be naturally vegetated along 75% of their lengths.
- Streams to have a 30-m naturally vegetated buffer.
- Corridors to be a minimum of 100 m wide (up to 500 m).

New Brunswick (Non-timber Management Objectives under the Crown Lands and Forest Act [NB DNR 2003])

- Deer wintering patches interconnected by winter travel corridors: conifer crown closure greater than 50%, 100 m wide.
- Buffer zones along all creeks range from 30 to150 m on each side.
- Recreational and aesthetic buffer of 30 m along roads and recreational waterways.

New Brunswick pioneered the defining of habitat objectives at a landscape level (see box) and similar efforts have been initiated across Canada, largely through partnership between provincial forest management agencies and industry. A 2002 survey of 25 randomly surveyed forest management operations with certified management systems nationwide found that three-quarters of the operations had incorporated biodiversity and conservation objectives into their five-year management plans and more than half of these operations had biodiversity objectives exceeding government requirements (Neave et al. 2002).

The development of these biodiversity objectives is just beginning. Baseline scientific information is often the limiting factor. The determination of threshold levels (the value beyond which the system can no longer be considered sustainable) is an additional consideration in setting objectives for biodiversity conservation. The forest community thus needs to establish an easily understood and workable process that can link current conservation management activities to the variety of objectives associated with biodiversity conservation and the maintenance of the integrity of natural forests. Table 10 demonstrates that the proposed web of conservation lands approach provides an assessment framework encompassing the breadth of current biodiversity objectives. The web framework allows assessment of the extent to which management objectives for representation, ecological integrity, and connectivity are being achieved.

With the recognition that conventional "protected" areas are not enough to ensure that key ecological functions are maintained across forested landscapes, conservation biologists are determining the cumulative impact of other protection mechanisms. This focus is in part a response to the pressure on forest agencies to demonstrate progress in achieving the Canadian Biodiversity Strategy commitments. Concurrently, the pressure to define measurable objectives for forest management units has also increased primarily because monitoring is a forest industry requirement for achieving voluntary certification of sustainable forest management. Scientists and wildlife managers have started to link patterns of forest structure and composition to more general habitat requirements. By 2002, these developments, along with the considerable progress in developing criteria and indicators to monitor changes in biodiversity and the assessment of the value of existing forest management guidelines, led to the forest community's adoption of forest management practices that emulate natural disturbance.

New Brunswick's Forest Land Habitat Management Program

This program, developed in 1992, facilitated the incorporation of wildlife habitat objectives into forest management plans. Habitat supply analysis indicated a future shortage of mature forest habitat that would affect 25 bird species and 4 mammal species dependent on this habitat type. The American marten, a species particularly dependent on mature forest, was chosen as an indicator species and specific habitat objectives were set to maintain a viable population. Each forest company must now maintain a specific amount of mature forest habitat over the long term.

Source: NB DNRE (1995).

Table 10. The link between specific biodiversity objectives in forest ecosystems and the five classes of conservation lands in Canada.

	Conservation land class				
Biodiversity objective	1 Wilderness	2 Reserve	3 Habitat	4 Management	5 Sustainable forest management
Protection					
10%	●	●			
Representation	●	●			
Ecological integrity					
Minimum stands					●
Overmature forest					●
Dispersal of patches					●
Snag density			●		
Woody debris			●		
Sediment loads				●	
Connectivity					
Extent and width of buffers			●		
Deer corridors			●		

Conclusion

In the past, integrated forest conservation strategies were implemented based on the recognition that different areas of forests have different values and therefore priorities for conservation. A more holistic approach is evolving that integrates various types of conservation mechanisms and land management practices to maintain biodiversity across landscapes.

This review of the literature shows that the use of a variety of policy and legislative mechanisms for biodiversity conservation in Canada may be effective in achieving sustainable forest management and biodiversity conservation across the landscape. We have suggested a grouping of the existing mechanisms into a proposed framework for planning, assessing, and reporting on conservation lands. The web of conservation lands approach will thus allow managers to measure the success of regional or operational policies and plans.

For Canada to be able to use this integrated conservation lands approach to demonstrate its conservation achievements across forested landscapes, there are several elements that require further development. The following list suggests some immediate priorities.

National and international consultation on the practicality of using the proposed classification to plan, assess, and report on the status of biodiversity conservation in Canada's forests. Fora such as the World Forestry Congress and the World Parks Congress would provide a wide selection of pertinent international input. National input might be best gathered from the Canadian Council of Forest Ministers or the Joint Meetings of the Councils of Ministers of Wildlife, Forest, Fisheries and Aquaculture, Parks, and Agriculture and Agri-food, where a national biodiversity agenda is starting to be developed.

Provision of a mechanism for compiling and distributing information. Readily available information for consistent reporting on forest biodiversity conservation for the State of the Forest report to Parliament, Criteria and Indicators processes, United Nations Forum on Forests, Convention on Biological Diversity Program of Work on Forests, Canadian Biodiversity Strategy, National Forest Strategy and so on would greatly enhance the appeal and use of a framework for reporting on conservation lands. The National Forest Information System would be a logical fit.

Mapping of conservation landscapes. To understand how the web of conservation lands framework of conservation legislation, policies,

regulations and guidelines integrates with management practices and other activities and constraints on the landscape, it would be beneficial to create a map of these activities. The resulting map would reveal areas where potential conservation landscapes may already exist or where there may be opportunities to create new ones.

Improved knowledge of the science underpinning the designation of a conservation landscape. The conservation lands framework classifies existing conservation mechanisms and introduces the new concept of the conservation landscape. The role of unproductive and nonmerchantable or noncommercial and northern forests in conservation landscapes needs to be determined. This paper has provided some general guidance for the designation of a conservation landscape but specific, science-based criteria are required before this classification can be fully implemented.

Linking the framework to a land classification system. The Canadian Forest Ecosystem Classification currently being developed through a national partnership coordinated by Natural Resources Canada will be effective for identifying ecosystems with high potential for conservation of biodiversity, exchanging forest management information across the country, and establishing a basis for representation of forest types.

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References

Note: All URLs were accessed in November 2004. However, given the fluidity of the World Wide Web, some may have changed since publication. As well, some Web documents listed here may not have been properly catalogued nor archived and therefore may become inaccessible in the future. In addition, some references have been updated since the submission of the original report.

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A Vision for a Web of Conservation Lands across Canada's Forests

XII World Forestry Congress Side Event
26 September 2003

Introducing a Web of Conservation Lands

David Neave

"While protected areas are undeniably vital elements of sustainable development, they are part of the broader landscape, and all contribute to conservation in some way. Protected areas are critical in severely disturbed landscapes, but less so where disturbance is low or moderate. The extent to which conservation objectives are met depends on the pattern of disturbance in the region considered, and thus on the mix of protected, managed and unmanaged lands.

"Many conservation objectives, including those for forest genetic resources, can be addressed outside formally protected areas and, in this regard the value of Canada's forested landscapes may be underestimated by foresters and environmentalists alike."[1]

What I am about to propose has been alluded to many times by many people over the last decade. This quote from Canadian Forest Service scientist Doug Pollard dates from 10 years ago and yet reflects the essence of my presentation: that is, that conservation objectives are addressed both within and beyond the boundaries of formally designated protected areas. It is difficult to appreciate the extent and impact of biodiversity conservation efforts in Canada's forests because existing information on activities occurring across the entire landscape has not been compiled. This information would provide a more complete picture of the integration of Canada's conservation and sustainable-use activities.

In developing an ecosystem-based approach to reporting on conservation lands—that is, lands managed to meet objectives that directly or indirectly contribute to biodiversity—we set the following objectives:

- identify the types and extent of conservation lands within Canada's managed forests;
- propose a simple classification system to categorize different policy and legislative conservation measures, including but not limited to protected areas; and
- review the reporting approaches of other forested countries.

Work began with an examination of legislation, policies, management plans, and other documents relating to the conservation of biodiversity in Canada. Almost all of Canada's forests are on public lands and therefore protected under legislation; most of these lands are owned by the provinces and territories and the protection accorded is applied through a multitude of acts such as those dealing with public lands, fisheries and wildlife, the environment, and parks. In addition, some provinces have legislation or action plans that deal with the sustainable management of private lands, including objectives to conserve biodiversity or maximize their ecological benefits to the environment.

Based on our analysis of the above, we proposed a classification and tested it through six case examples at the provincial and operational levels; made comparisons with how other countries report on the extent of their conservation efforts; and then examined how this web of conservation lands actually helps to achieve biodiversity conservation.

The challenge was to devise a classification system that would be simple but still capable of capturing the array of conservation, legislative, and planning and policy mechanisms aimed at maintaining biodiversity on a forested landscape. The system would need to include management priorities for each class, such as the maintenance of ecological processes, types of and limits on human disturbances, and retention of critical and sensitive sites. The classification had to be able to recognize the importance of size, configuration, and connectivity in forming a web beneficial to biodiversity conservation at the landscape level. And finally, the system had to be compatible with other international systems and standards.

A diagram of the proposed system can be found in the brochure accompanying this presentation.[2] The system has five classes, four of which are classified based on management objectives to maintain biodiversity.

[1] D.F.W. Pollard.1995. Ecological reserves. Pages 21–26 *in* T.C. Nieman, A. Mosseler, and G. Murray, compilers. *Forest Genetic Resource Conservation and Management in Canada.* Natural Resources Canada, Canadian Forest Service, Information Report PI-X-119. Ottawa, Ont. Quotation on page 23.

[2] More abbreviated version of this brochure, now entitled *Forest Conservation Lands*, can be found inside the back cover of the present publication.

The first four classes are (1) **wilderness areas**, areas that preserve natural conditions and are without human disturbances; (2) **nature reserves**, areas that maintain significant natural and scenic features; (3) **environmentally significant areas**, areas that permanently protect unique habitat features fundamental for the survival of species and populations; and (4) **conservation management areas**, areas that maintain or restore targeted wildlife or plant populations. The fifth class is the **conservation landscape**. An area is recognized as a conservation landscape when classes are spatially situated in a way that, in conjunction with other adjacent areas, a mosaic is formed that contributes to the long-term maintenance of biodiversity on the landscape. To determine how a conservation landscape would be recognized, we referred to the IUCN (World Conservation Union) eligibility criteria[3] and adapted them, with few changes, as selection criteria (see the enclosed brochure) to provide guidance for the recognition of a conservation landscape. These selection criteria address representation, ecological integrity, management actions, and connectivity.

The forest industry, governments, and management authorities also make important contributions to conserving biodiversity outside of legislated conservation areas. When strategically situated, timber-productive and nontimber-productive forest land may significantly contribute to the conservation landscape by providing the matrix that links conservation lands classes 1–4. On timber-productive forest land, there are a variety of required biodiversity guidelines, objectives, and regulations that address biodiversity conservation. These include woody debris requirements, the retention of wildlife trees or small forest patches within clear-cuts, and the planning of harvest to mimic natural succession. Nontimber-productive forest land, comprising 40% of Canada's commercial forest, is an important component of the web of conservation lands.

The compatibility of the proposed classification with the IUCN international standard was also examined. The proposed system recognizes sustainable-use activities as an element of conservation and is compatible with IUCN protected area categories. There have been problems of consistency in interpreting the IUCN protected area categories. The result has been wide variation in international reporting. For example, some countries report all their forests as protected, even though there may be clear-cutting operations in those forests. Other countries, like Canada, which has retained almost all of its natural forest, take a very conservative approach, reporting primarily on IUCN categories I and II.

In conclusion, it is proposed that Canada consider the adoption of a comprehensive classification that recognizes the extent of biodiversity conservation efforts. The system described above recognizes that these efforts go beyond the establishment of islands of protected areas. This system, based on existing management efforts for biodiversity conservation, will facilitate

- reporting at a national level on such issues as criteria and indicators of sustainable forest management;
- planning broad land uses and operations;
- responding to expanding stewardship initiatives;
- responding to emerging biodiversity issues such as climate change or invasive alien species;
- answering public concerns on sustainability issues; and
- defining research priorities

An ecosystem-based approach is an emerging management paradigm and will require realignment of research and reporting priorities. For example, currently there is limited understanding of the value of nontimber-productive areas. The system needs to be further developed by incorporating existing land-use information to clarify what is actually happening on the landscape. The goal is to provide fundamental basic information to be able to analyze Canada's success in achieving biodiversity conservation. We encourage more people to become involved in the testing and development of this system.

[3] IUCN (World Conservation Union). 1994. *Guidelines for Protected Area Management Categories*. IUCN, Gland, Switzerland, and Cambridge, UK. x + 261 p.
World Commission on Protected Areas (WCPA), Australia/New Zealand Region. 2000. *Application of IUCN Protected Area Management Categories*. Draft Australian Handbook. WCPA, Australia/New Zealand Region, Wellington, New Zealand. 87 p.

Discussion Question 1

Does this web of conservation lands provide the necessary foundation to maintain biodiversity at the landscape level?

Summary

Wiktor Adamowicz

The web of conservation lands probably provides a foundation for conservation planning and could be a valuable tool in helping to meet Canadian biodiversity goals. However, these goals may be inadequate in the face of global influences, such as population growth and climate change, and the web's structure too simplistic in its linear connectivity to account for complex biological relationships across landscapes. In addition, the web needs to include a category that would address settled forest landscape.

The strategy should be to focus on monitoring, inventory development, and research in an adaptive management framework.

The web of conservation lands may reduce risks of biodiversity loss and the costs of biodiversity conservation.

Biodiversity Conservation in an Era of Uncertainty and Change

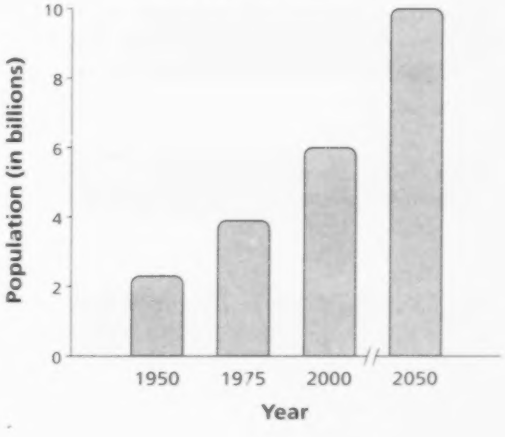
David Deyoe

Global events have local implications. In this presentation, I will provide a broader context to the concept of a conservation web by examining some of the global events and issues that may influence decisions on conservation. Are we prepared to deal with the associated uncertainty?

Increasing population levels have a major impact on conservation decisions. In the last 40 years, the world's population has doubled (Figure 1). In the next 40 years, it will probably double again, even if the birth rate falls. Life expectancy is increasing; a young girl born today can expect to live to a hundred. In North America, longevity is affecting demographics—in the next 10 years, 40% of the population will be over the age of 50. These population dynamics affect policies and actions on biodiversity conservation.

In addition, as the population increases, the amount of land available for food production decreases (Figure 2). From 1950 to 2000, there was nearly a 50% loss in arable land; by 2050, with an expected population of 10 billion, arable land will have decreased by another 30%. Contributing and compounding factors include fragmentation of landscapes as a result of urban sprawl, floods and

Figure 1. **Past and projected growth in world population.**



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Biodiversity Conservation in an Era of Uncertainty and Change

David Depew

Past and projected growth in world population.

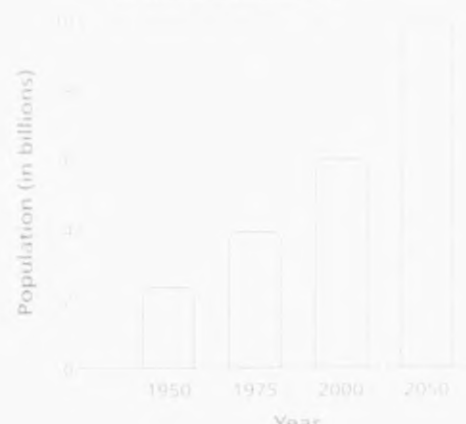
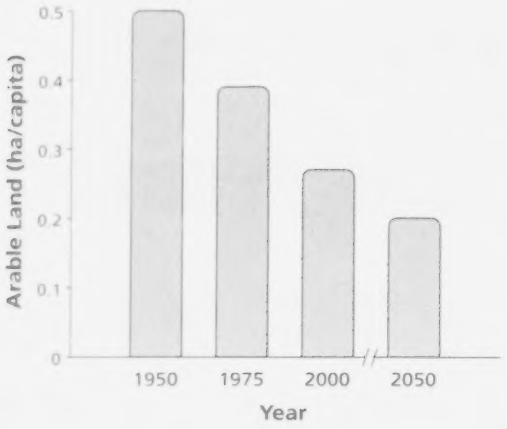


Figure 2. **Past and projected loss of the world's arable land.**



droughts, and creation of protected areas; as well, more land is out of production because of the changing lifestyles of landowners.

Water is a driver of change. Its quantity, quality, and importance as a habitat are at risk.

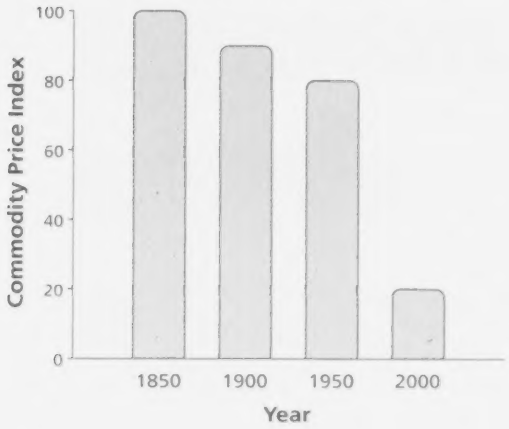
Disturbances to the environment—biotic ones such as insects and diseases and abiotic ones such as fire, wind, drought, and flood—also drive change and may interact to exacerbate the overall impact. Overshadowing but directly affecting these drivers is another major influence, global climate change.

In 2003, the Ecological Society of America and the Union of Concerned Scientists published a report on climate change.[1] The report gives projections (for 2030 and 2095) of future climate change for the Great Lakes states and one Canadian province. For example, in 30 years, a summer in Michigan may feel more like one in current-day Ohio and in about 100 years, more like one in northern Arkansas; similarly, by 2030, a summer in Illinois may resemble that of Oklahoma or Arkansas and by 2095, that of eastern Texas. These projected changes in climate are substantial.

The global economy is a significant driver of change. In the last 150 years, the commodity price index has gone down by almost 80% (Figure 3); 50% of the drop has occurred in the last 30–40 years.

[1] Kling, G.W. et al. 2003. Confronting climate change in the Great Lakes region: impact on our communities and ecosystems. Report of the Union of Concerned Scientists (UCS) and the Ecological Society of America (ESA). UCS, Cambridge, MA /ESA, Washington, DC. 92 p.

Figure 3. **Commodity price index, a measure of changes in transaction prices of raw materials produced in a country and sold in world markets.**



Intensive forest management has made it possible to increase timber production in many parts of the world. As a result, producers are moving operations to locations where yields can be maximized at lower prices. Mergers and buyouts are putting low-profit operations at risk, leading to mill closures and socio-economic decisions for communities. A company that may have had mills in two or three provinces in Canada now has mills around the world. In looking for mill locations where profits can be maximized, managers take a global perspective, and Ontario, Alberta, and Quebec have to compete with the southeastern United States, Southeast Asia, Russia, or South America. As well, the escalating bio-economy is changing how forest products are viewed, the benefits they provide, and the sectors they serve. There is a growing market for nontimber forest products and other bio-products worldwide and thus significant opportunities for small businesses, entrepreneurs, and rural communities to develop products for this new market.

Decisions on a conservation matrix will have to be made within the confines of existing social and cultural values. These values are changing and must be carefully weighed in developing a conservation concept. Some potentially conflicting values that planners and managers must take into account are sustaining resources, conserving biodiversity, protecting resource values, maintaining the lifestyles of communities, citizens, and industry workers, and dealing with human-derived stresses to the environment.

If a conservation web approach can be used to address the implications of and uncertainties associated with global and local influences on biodiversity, then I believe this approach can be a valuable tool—for policy makers, planners, and land managers concerned with decisions on the conservation and sustainable management of biodiversity. We must then ask, what temporal or spatial scales do we use to monitor and assess possible impacts? What do we measure? How do we move from a more traditional system of static parks to a more holistic system that encompasses conservation and resource use and can accommodate uncertainty and change?

DUC and Conservation in the Boreal Forest

Eric Butterworth

Ducks Unlimited Canada (DUC) is dealing with many of the same issues raised by the proposed web of conservation lands in a program we are conducting in the western boreal forest. We believe that the fifth proposed class, the mosaic of areas that collectively maintains biodiversity across a landscape, is probably the most important and would like to see conservation objectives being applied across the entire landscape.

Our concern regarding a conservation strategy relates to time frames and mode of implementation. For example, in the Northwest Territories, the conservation process can take up to six years and is expensive.

We tend to see a system of conservation lands as a network of connecting sites rather than as a "web" because the latter term implies linear connectivity. We also have some concerns about riparian zones as potential conservation areas in the proposed web. They are often defined by fish habitat criteria, and we do not yet understand how riparian habitats function nor the thresholds for their size. This is a concern for DUC. As well, connectivity tends to be species specific; the type of connection required may vary with the life stage of an organism. Scale is also an issue when planning for connectivity across the landscape. For example, how do you compare habitat requirements for a spider with those of a mallard, which can leave an area and fly great distances? We see connectivity as a landscape issue.

We suggest that a specific landform be the ecological unit of a conservation process. For DUC, the landform of choice is the watershed; it is a functional unit to which we can readily relate water, the habitats it provides, and the organisms dependent on it. However, watersheds are often difficult to identify, making operational implementation of this unit challenging. Other landform systems, for instance, surficial geology, could also be used. A conservation approach that uses watersheds or natural landforms as its basic ecological unit would consider the entire mosaic of habitats within the watershed.

Measuring and monitoring biodiversity remains a challenge that we face in the boreal forest. The Alberta Biodiversity Monitoring Program has proposed an approach that will, I hope, soon be put in place to address some of these challenges.

Scale of management is another consideration. A coarse-filter approach involves monitoring and managing entire ecosystems (habitats, plant communities). This approach as compared with a fine-filter approach, where lists of species or populations are inventoried, assumes that species and genetic diversity are by default included. However, as Dr. John Spence pointed out in his presentation earlier this week[2], while a coarse-filter approach to management may be functional and operationally preferable, monitoring still needs to be done with a fine-filter approach, especially where species at risk or species of special concern are a consideration, in order to verify that coarse-filter goals are being met.

It is difficult to assess whether the proposed system can ensure biodiversity conservation. The fifth class should involve a mosaic of habitats across a forested landscape. In the boreal forest, specific thresholds for biodiversity have not yet been developed. A great deal of information to direct conservation efforts has been iterated, but not all information, including the underpinnings for some of the criteria and indicators of sustainable forest management,[3] is based on sound research. We

[2] Langor, D.W.; Spence, J.R. 2003. Arthropods as ecological indicators of sustainability in Canadian forests. Page 340 *in* Part A. Forests for People. Forests, Source of Life. Proceedings of the XII World Forestry Congress, 21–28 Sept. 2003, Québec City, Que.

[3] In 1995, the Canadian Council of Forest Ministers agreed on a set of science-based criteria and indicators (C&I) that could be used to define and measure Canada's progress in the sustainable management of its forests. Canada is also a member country of the Montréal Process, an international C&I initiative.

need to start to build a knowledge base and determine how to better measure these indicators.

Furthermore, even protected areas will require management. Designating an area as protected is only the beginning of the process.

Understanding a forest means more than knowing about its trees. Other factors, for instance, soil type and hydrology, need to be considered in forest functioning. The criteria and indicators of sustainable forest management pay scant attention to wetlands and water. We would like to see a more integrated approach to landscape management, one that includes not only treed land but also wetlands.

Wildlife does not respect political borders. Although management measures may be in place at a local or even watershed level, major impacts may be occurring much farther away. Some waterfowl winter in California or the Gulf of Mexico; some songbirds in South America. Any system for conservation will have to take into account factors occurring at a continental or hemispheric level.

We recommend a management strategy for a conservation lands process that is built on a strong ecological knowledge base, integrates resource sustainability, involves ongoing research, and identifies, measures, and monitors goals. The process must be adaptive, capable of change like the dynamic landscapes it is intended to conserve.

How can forest managers strengthen and benefit from the web of conservation lands?

Summary

Wiktor Adamowicz

A strategy for strengthening the policy and institutional framework for the web of conservation lands was outlined. This included strengthening legislation, implementing guidelines, undertaking inventories, monitoring strategies, and investing in or providing resources to the effort.

The web of conservation lands approach will help the forest industry account for how it meets its social responsibilities with respect to biodiversity conservation. Through this framework, forest managers can justify, demonstrate, and attribute costs for their conservation efforts. The web approach also recognizes the contribution of nonproductive forest lands to biodiversity conservation, thus allowing industry to incorporate such lands into biodiversity conservation programs. As well, the approach may also provide a way to harmonize various biodiversity conservation programs being implemented within companies and thereby reduce costs. Finally, the web approach permits clear reporting on biodiversity goals, which is a significant factor in dealing with international markets and customers.

A Provincial Perspective on Managing Conservation Lands

Linda Touzin

The following questions would need to be considered as prerequisites for addressing the theme questions for this part of the discussion:

- Does legislation exist that ensures biodiversity aspects are considered during a forest intervention?
- Are there means to implement such legislation and related guidelines?
- Are forest-resource inventories current, complete, and relevant?
- How can provincial information be "rolled up" nationally and internationally?

The questions focus on provincial planning for conservation lands and I will address them mainly in relation to the situation in Ontario.

The overriding principles of Ontario's Crown Forest Sustainability Act are to conserve biodiversity and to emulate natural disturbances and landscape patterns in crown-owned forests. Although no similar forest management legislation exists for private lands, many municipalities are developing by-laws directed at tree conservation; this will help ensure that some private forests are well managed.

The Forest Management Planning Manual was prepared in accordance with the Crown Forest Sustainability Act and is the instrument, along with about 35 provincial guidelines, for implementing the act. Together, manual and guidelines deal with all aspects of planning, from landscape- and stand-level decisions to the selection of individual trees for harvesting during an operation. The manual also directs forest managers to provide objectives and strategies related to ecosystem, stand, and genetic diversity.

Resources, in the form of money and expertise, for implementing commitments to biodiversity conservation are not yet sufficient. In the last several years, Ontario has made a lot of progress in this

area, but there is still a gap between what is available and what is needed.

Forest-resource inventories form the foundation of good forest management planning. Existing inventories of tree species have linkages to forest ecosystem classifications. Nevertheless, it is uncertain whether these inventories contain the information we need; that is, whether they are sufficiently comprehensive or relevant to allow us to determine the present status of our forests or determine what is required for their future.

Underlying many of the concepts forming the web of conservation lands approach is a desire for Canada to be recognized for its efforts to conserve and sustainably manage biodiversity through improved forest management practices. To achieve this, we need to be able to amass information about conservation lands from a variety of landowners and jurisdictional levels and then be able to report that information on national and international scales. The reporting structure would have to accommodate stringent mechanisms already in place, such as those for crown lands, as well as less formal ones, such as those for private or federal lands. Criteria for classes must be well-defined and the system transparent so that it is easy to determine into which class a well-managed land would fall.

An Industry Perspective on Managing Conservation Lands

Mark Hubert

As a representative of the forest industry, I will take a different approach to the question about how forest managers can strengthen and benefit from the web of conservation lands. I will instead discuss why industry sees the web of conservation lands as an interesting concept.

A major reason for interest in this concept is that the conservation ethic is important for industry. Businesses, including those in the forest sector, are increasingly incorporating social responsibility elements into their policies and practices. Sustainability of forest resources is now the mantra of both government and industry. This means making commitments to ensure the conservation of biological diversity. In Canada, 95% of forest land is publicly owned. The forest industry operates under a social license to the public and to the government. Therefore, it is critical that industry works with governments and the public in developing its conservation ethic. Efforts so far include projects partnering industry with nongovernmental organizations (such as Ducks Unlimited and the World Wildlife Fund) and with various levels of governments, as well as projects confined to within a company. Such activities are an opportunity to engender public support for establishing a conservation ethic in the forest industry. The web of conservation lands approach may further industry's efforts to promote a conservation ethic.

Industry is also interested in the proposed web of conservation lands because it embraces many types of forested landscapes, not just protected areas. Discussions of biological diversity tend to focus on how much protected area has been created, primarily because protected areas are considered to be the principal tools for conservation. Sustainable forest management, however, requires more complex thinking. Conservation of biological diversity must be dealt with within the context of sustainable use and along with many other values that must be taken into account in planning and management operations. Special management zones, wildlife habitat areas, and riparian zones, which by their very nature are dedicated to the maintenance of biological diversity, are not considered protected areas. The proposed web of conservation lands recognizes the importance of maintaining ecological processes, limiting recreational, commercial, and resource development, retaining critical or sensitive sites, and protecting genes, species, habitats, and landscapes outside of protected areas.

My third point returns to the need for a tangible product to illustrate the biodiversity values being maintained through management practices, both inside and outside of protected areas. However, currently, most of the components that can be mapped are those within the context of protected areas. We do not yet have the mechanism to delimit or measure components across all classes or across the entire Canadian landscape. For instance, how does one differentiate between activities restricted within 100 m of an eagle's nest from those within 800 m of it or between a company's operations in parks versus in other areas?

Another aspect of the web of conservation lands that is of interest to industry is that this approach incorporates linkages that may be relevant to the forest certification process. For instance, some companies are involved in identifying high

conservation value forests or forests of exceptional conservation value through certification processes such as the Forest Stewardship Council or the Sustainable Forestry Initiative. We would like to determine what the linkages are between the web of conservation lands approach and these other conservation initiatives.

Finally, a web of conservation lands will help provide a level playing field with the international community. Canada's forest industry functions and competes internationally. We must be able to compare ourselves to other forest-producing nations and to report on protection and maintenance of biodiversity using similar terminology.

3

How does Canada's web of conservation lands approach fit within an international perspective?

Summary

Wiktor Adamowicz

An international context for the discussion of conservation lands was provided by reviewing the six IUCN (the World Conservation Union) categories of protected areas. A summary of relevant discussions at the World Parks Congress in Durban, South Africa, in 2003 highlighted some of the difficulties associated with the interpretation and application of these categories, especially V and VI, to forest ecosystems.

Australia's forest conservation reserves span all types of forest landscapes and involve a range of conservation activities. Although there are still some gaps in Australia's forest reserve estate, the conservation process is considered a success.

Lessons that can be learned from Australia's experience in its development of conservation reserves are as follows: set objectives; assess tradeoffs; negotiate and be flexible; invest in compensation for the various stakeholders, in tools development, and in the process; and align incentives for conservation with other incentives facing landowners and managers.

The conservation lands approach being discussed by the forest community and introduced by Wren Resources ("Canada's web of conservation lands") is similar to the Australian model for biodiversity conservation in that both embrace conservation activities outside of protected areas. There is strong support for and interest (including by the IUCN) in this concept termed a land-use matrix approach. However, both Canada and Australia allow for industrially managed landscapes in their approaches, whereas the IUCN excludes such lands from its categories.

A land-use matrix approach can fulfill biodiversity as well as other objectives. It requires changes to institutions and policies, an understanding of ecological processes, and the development of ecological approaches to management.

Canada's web of conservation lands may herald a new approach to the conservation and sustainable management of biodiversity.

IUCN Protected Area Categories

Andrew Deutz

About 2500 people gathered in Durban, South Africa , 8–17 September 2003, for the World Parks Congress, an event similar to the World Forestry Congress but focusing on parks and protected areas. Roughly 12% of the planet's land surface is now under some type of formal protection. I am going to be somewhat heretical for a conservationist and say that I believe the future of conservation depends on what happens in the other 88%. The concept of a conservation landscape, particularly in relation to what is happening outside of protected areas, is an essential part of any discussion on the future of biodiversity conservation. Recognition of the importance of the linkages between protected areas and the surrounding landscape is one of the recommendations adopted at the World Parks Congress. Even park managers are looking at how protected areas integrate into a much larger land-use context and matrix. Protected areas are the

cornerstone of any biodiversity conservation strategy, but they have to be connected to and relate to the much larger surrounding landscape.

The IUCN (the World Conservation Union) defines "protected area" as an area of land and/or sea that is especially dedicated to the protection and maintenance of biological diversity and of natural and associated cultural resources and that is managed through legal or other effective means. An area of land or sea must meet all of the following requirements to qualify for designation as an IUCN protected area:

Aim

Especially dedicated to the preservation of ecosystems, species, and genetic diversity.

Also dedicated to protection and maintenance of existing natural and associated cultural resources.

Implementation

Protected and managed through legal or other effective means.

Time scale

Set aside as a protected area for present and future generations (in perpetuity).

Size

Large enough to facilitate preservation of species and genetic diversity in line with management objectives.

Management responsibility

Managed by an appointed management body that includes or has access to appropriately qualified personnel.

Ownership

Legally clarified.

Documentation

Boundaries and management objectives adequately documented.

There are six IUCN categories of protected areas. The categories are a tool for comparing designations of land use for protected areas. They are not a tool for classifying broader land uses outside of protected areas. They are not so general that they include all lands that contribute to biodiversity, nor to conservation in general.

The categories of protected areas are as follows: (I) strict nature reserve/wilderness or wilderness area; (II) national park; (III) natural monument; (IV) habitat/species management area; (V) protected landscape/seascape; and (VI) managed-resource protected area.

The IUCN categories are designed around management objectives—how the lands are being used. They were derived starting in 1974 and have gone through a series of iterations. They are used today by the FAO for collecting data for resource assessment of UN-listed protected areas in a number of criteria and indicators processes. The categories have become an international standard for designating protected areas. They thus allow for country comparisons and international syntheses. There are of course some problems with the system, as with any system of self-reporting. Some Central European countries claim all their national forests are protected areas because industrial activities are not permitted in them. Even more extreme are countries asserting that the median strips between highways, because they are not subject to industrial activities, are protected areas. I would argue that the land between two lanes of the Autobahn is probably not an effective wildlife conservation area. Perhaps my favorite Orwellian construct of a protected area comes from a tropical country whose forests are a significant factor in the overall macro-economy; this country advocates that areas should be designated as protected in order to safeguard the jobs of loggers.

A few important issues surrounding the IUCN categories were tackled at the World Parks Congress. The six categories are arranged more or less to show a gradation of increasing human intervention in the protected area landscape, from nature reserves and wildlife areas having minimal or no human interaction to managed-resource areas. The last classification was created in the early 1990s, modeled largely on extractive reserves such as Chico Mendes in Acre state in western Brazil. In extractive reserves, areas of protected landscape are preserved for sustainable exploitation such as rubber tapping; these are not industrial areas; nevertheless, commercial use values and harvesting activities are components of such protected areas.

There was a fairly lively discussion during the World Parks Congress about removing category V and VI protected areas because some commercial activity is allowed in them. The Congress decided to keep the six categories, reaffirming that there is a gradation of increasing human intervention within the protected area system, but acknowledging that the IUCN needs to better explain this rationale. In

particular, it needs to improve its understanding of how the category system can be applied to forest ecosystems. The IUCN and its World Commission on Protected Areas hopes to release some guidelines within a year.

Another major issue discussed at the World Parks Congress was that of private conservation areas and privately owned parks. Traditionally, parks and protected areas are managed by government. We now recognize that this is not always the case, although still mostly true of Canada. In the United States, however, some nongovernmental organizations have significant landholdings and conservation easements. In South Africa, private landowners operate protected areas and game reserves for commercial purposes; here ecotourism focusing on large game mammals is a lucrative business and involves large expanses set aside and managed for conservation purposes. We are therefore starting to grapple with the issue of private ownership of protected areas.

Finally, I have a few technical points to make on the background paper and the web of conservation lands vision that was put forward. Overall, I am impressed with the notion of the web, or matrix, of different land-use categories. However, the IUCN definition of a protected area was not included in the paper. This definition is the first filter as to whether or not a particular area qualifies as protected; if it does, then you can determine into which of the six categories it belongs. Note also that the World Commission on Protected Areas excludes industrially managed landscapes from its categories of protected areas. This is of particular importance in relating Canada's web to the IUCN categories. The first four IUCN categories could be applied to most of your conservation lands, and other areas within that conservation landscape that are not industrially managed would qualify within categories V and VI. However, riparian zones within a forest license or within a forest management area would not be considered protected areas because they are within an industrially managed concession. We recognize that they are important elements of sustainable forest management and include important biodiversity conservation and corridor values, but we would not call these areas protected.

The IUCN categories are limited to protected areas and do not include broader conservation landscape. We have occasionally explored how to classify the broader conservation landscape in relation to biodiversity conservation values; we ran into some difficulties when we started working with different country contexts. Some systems that work for the country in which they originate break down when applied at an international level. It was difficult to make comparisons; there were problems with terminology. However, one system we found that seems to work fairly well is an Australian example (see Rodney Keenan's article below), in part because it differentiates between protected areas and other land uses that contribute to biodiversity conservation.

I will end with a couple of key messages. First, the IUCN views protected areas as the cornerstone of a biodiversity conservation strategy. At present, 12% of the landmass falls within such areas. Even if that were to double, it would still not be sufficient to ensure biodiversity conservation or prevent the accelerated extinction of species. Key decisions in conservation are going to relate to what is happening outside of officially protected areas. For that reason, the notion of a conservation landscape makes sense to us at the IUCN. We are particularly interested in the concept of a land-use matrix that includes protected areas, corridors, agricultural areas, industrial forests, non-industrial forests, and a whole range of activities.

Next, the sustainable land-use matrix will provide a variety of values including in situ biodiversity conservation and wildlife migration corridors that will allow for adequate genetic exchange between populations. The system must also be robust enough to deal with climatic changes and allow ecosystems to adapt naturally to such changes.

Finally, I advise you to avoid the numbers game, that is, trying to find the magic number—10%, 20%, 30%, or 50%—for conservation lands. We seem to do this a lot in international processes. The bigger challenge is making decisions on landscape context, at a macro- and micro-level. This means having a more sophisticated approach to understanding what makes conservation work and what makes a landscape work for conservation.

Australia's Forest Conservation Reserves

Rodney Keenan

Australia represents an interesting comparison with Canada because of the similarity of their federal

structures. In Australia, management of reserves is largely under the control of state or territorial agencies. Australia is one of the world's megadiverse countries.[1] There are significant areas of endemism, particularly in the wet tropical forests of North Queensland and in the subtropical and temperate forests of southern Australia. I will describe the approach used in Australia over the last 10–15 years to establish conservation reserves. I feel this model will prove useful to you in building a Canadian approach to the conservation and sustainable management of biodiversity.

I agree with many of the speakers that conservation reserves are no guarantee that species will not be lost. In the past, Australia has seen significant species extinction as a result of the conversion of forest and woodland areas to agricultural land for uses such as cropping and intensive grazing. However, the most recent extinctions of Australian forest-dwelling species are not the result of habitat loss: for example, frogs in protected areas in the wet tropical forests of North Queensland appear to be succumbing to an introduced fungal disease, and marsupial species elsewhere in the country have suffered heavy losses from predation by introduced feral foxes. In efforts to preserve species, we need to consider a range of threats. Climate change has been mentioned by several people at the workshop. The recent fire events in Australia and Canada are also significant threats to biodiversity and need to be considered in a holistic approach to managing forests.

In Australia, as in Canada, concern about the conservation and sustainable management of biodiversity, and the environment in general, has been a significant political issue for the last 20 years. It has even figured prominently in a number of federal elections. Consequently, throughout the 1980s, state agencies endeavored to set up a conservation reserve system that more systematically represented the range of different ecosystems and vegetation types in Australia and to identify those ecosystems that were either rare, at risk, or threatened. Conservation objectives were explicitly recognized in the National Forest Policy Statement, an agreement between the federal and state governments signed in 1992. This Statement was largely driven by domestic requirements but it was also important in Australia's preparations leading to the United Nations Conference on the Environment and Development held in Rio de Janeiro in June 1992 and its response to two subsequent agreements, the Convention on Biological Diversity and the Non-Legally Binding Authoritative Statement of Principles for a Global Consensus on the Management, Conservation and Sustainable Development of All Types of Forests. We then began to implement the National Forest Policy Statement, which provided for a series of regional forest agreements (RFAs).

The significant forest or timber production areas in Australia are in the southeast, in the southwest, along the east coast, and on the island of Tasmania. In the 1990s, one way the federal government controlled land use in these regions was through export licenses for forest products. These licenses had to be renewed annually, and this caused considerable controversy within the government and in the community about which areas should or should not be harvested. A major demonstration by the forest industry and timber-based communities took place at Parliament House in Canberra. As a result, the prime minister undertook to implement a series of long-term regional forest agreements, which would include comprehensive regional assessments to determine social, economic, and environmental values for the regions under agreement. At this time, the government also set targets for conservation planning purposes under the National Forest Policy Statement, including one objective to have at least 15% of the pre-1750 distribution of each forest type in conservation reserves. In addition, targets were set for the conservation of old-growth forest and higher targets established for ecosystems considered rare or endangered.

The regional assessments had to identify, at a fairly fine scale, the different regional ecosystems and vegetation types. Conducted across the country, they required a significant investment in mapping of floristic, topographic, geologic, and climatic variables and involved the development of a new approach to ecosystem classification. Once these ecosystems were identified and values assigned to their productivity, there was a systematic analysis of the trade-offs required to achieve conservation objectives. For the most part, conservation targets were achievable, but for some areas it was felt that the economic and social impacts of meeting those targets would be too great and expectations had

[1] Between 60% and 70% of the planet's total biodiversity is found in 12 countries; these countries are referred to as megadiverse.

to be lowered. The system thus allowed some flexibility for the governments involved to make balanced decisions. The result was a mix of formal and informal reserve areas, all of which are legislated and satisfy the IUCN requirements in terms of protected area status.

As a background to all of the above, I will give you an overview of the forest cover types in Australia. About two-thirds of our forest cover is savanna–woodland (20–50% crown cover); although not generally used for timber production, it is an important economic resource for other values. The basis of our forest industry is about 40 million ha of open-forest (50–80% crown cover) spanning the country. In addition, there is around 4 million ha of closed forest (greater than 80% crown cover), mainly temperate, subtropical, and tropical rainforests, and 1.5 million ha of plantation, which currently supplies about 60% of the timber production. Tenure of native forest in Australia is as follows: 13% nature conservation reserves, 7% multiple-use forest (state forest), 46% leasehold, 24% private, 8% other crown land, and 1% unknown. Achieving conservation objectives on private land is an important issue for Australia. The regional assessments applied only to forests on public land and thus to a relatively small proportion of our forest estate.

Since 1998, more than 2 million ha has been converted from production to conservation tenures because of the RFAs; there is now 6.6 million ha of forest reserve in the regions that were assessed and the area available for timber production is down by about 6.8 million ha. As a result, 15% of the lands fall into one of the IUCN protected area categories. As mentioned in the previous presentation, there is some debate about the extent of commercial activities that should be permitted in category-VI reserves and consequently on the extent of forests that could be included in that category. Of Australia's 17 national-scale forest types, 14 meet the IUCN minimum target of 10% of their current area in conservation reserves. The growth stage for 14 million ha of forests in the RFA regions is now known, and 70% of old-growth forest in RFA regions is in conservation reserves.

The outcome of Australia's conservation reserve process has generally been favorable. However, as mentioned by other speakers, areas outside of protected areas must also be monitored and the number of species lost across the whole landscape measured. We also need to consider the future dynamics of the forest estate. Some current old-growth forests will not be old growth in a hundred years. Old-growth eucalyptus forests may be replaced by some other vegetation types. In a number of areas where the fire regime has changed, eucalyptus is giving way to rainforest. Fire and other disturbances need to be considered in the management of the future forest estate and in the conservation of old-growth forests.

Australia still has some gaps in its reserve estate. Around 110 million ha of woodlands has not been fully assessed and may require new reserves to meet conservation objectives. This will be more challenging as much of this area is under private ownership or management and is the resource base for other industries such as grazing. As well, a significant cost is associated with the establishment of forest conservation reserves. Resource-dependent industries were compensated for losses and for cancellation of existing timber contracts with state agencies. The federal government invested heavily in industry development, value adding, and other adjustments required by industry and communities. Finally, privately managed lands are also problematic, but we are seeing some progress; for instance, payments are being made to private landowners for achieving conservation objectives.

I will end by saying that Canada's conceptual model for conservation land is similar to Australia's and that the holistic approach embracing conservation activities occurring outside of protected areas is consistent with the Australian experience.

4

What opportunities exist to address the gaps in and extend the vision of the web of conservation lands approach beyond the forest sector?

Summary

Wiktor Adamowicz

An information-sharing mechanism, the National Forest Information System, was described. One function of the system is to acquire, integrate, analyze, model, and disseminate geo-referenced information, a capability that could be used to enhance the web of conservation lands approach. The presenter used an example of protected areas to illustrate how this might be done.

The lack of clear, measurable biodiversity objectives was identified as a major gap in the proposed conservation lands approach. The presenter maintained that legislated protected areas are essential for biodiversity conservation because forest management practices to attain biodiversity objectives are not well understood. Protected areas are only representative fragments of entire forest landscapes. Lands between protected areas provide important habitat for biodiversity, and clear biodiversity objectives for these areas are also required. The framework for designing a web of conservation lands is critical. The Canadian Forest Ecosystem Classification was suggested as a framework for setting objectives for the web. The contribution to the maintenance of biodiversity from Canada's vast nontimber productive forest land requires examination as not all forest ecosystem types are represented in this area.

NFIS: A Mechanism for Information Sharing

Robin Quenet

The Canadian Forest Service (CFS), Natural Resources Canada (NRCan), is building a National Forest Information System (NFIS) for the Canadian Council of Forest Ministers (CCFM) to report on the status of Canada's forests and its sustainable management. The NFIS framework is designed to provide

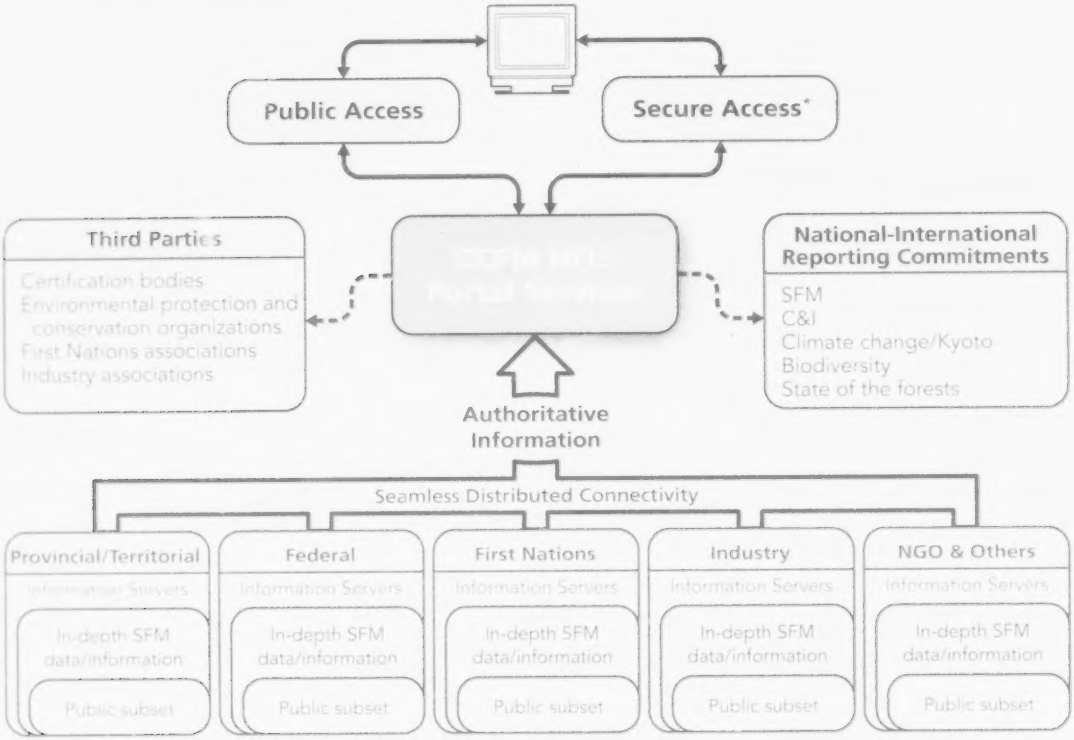
- ready access to the most current, consistent, and reliable forest resources information;
- the transparent integration of information across jurisdictional boundaries; and
- consistency in reporting.

The sharing of technology and the elimination of duplication in reporting will reduce costs and result in more efficient and effective communication on Canada's forests.

The NFIS will significantly enhance the capability of participating parties to

- present an accurate picture of Canadian forest practices;
- make national and international statements on sustainable forest management practices;
- provide the strategic context for provincial, territorial, and federal agencies to easily and reliably address regional, national, and international challenges to Canadian forest practices;
- support provincial, territorial, and federal commitments to open participation in forest policy to citizens by making available the necessary information for informed debate; and

Figure 1. Full implementation of the National Forest Information System would distribute authoritative data sets and information from a variety of sources across the country (SFM = Sustainable Forest Management; C&I= criteria and indicators).



*User Access Control (authentication and authorization)

- enable agencies to better deal with cross-provincial/territorial and other jurisdictional issues.

This reporting framework requires access to and viewing of information that is held by the partner provinces and other organizations. The initial challenges for information sharing were therefore

- that the partners were autonomous organizations with business practices in place for meeting their own requirements, and
- that the information that could be shared was disparate and distributed across Canada.

To connect the provinces' independent systems and make them interactive, we needed a network of content servers, hosts that hold the information, working within a common information and services framework. We adopted Open GIS Consortium (OGC)[1] Web Map Technologies (WMT), an international standard; these technologies form the basis of vendor-neutral information interoperability over the network. "Vendor neutral" interoperability means information can be shared irrespective of the existing information storage and management systems being used by participating organizations.

As mentioned, the purpose of the NFIS is to acquire and disseminate information from autonomous sources in support of reporting on sustainable forest management. Basically the system must be able to seamlessly integrate spatial and nonspatial information and then analyze, model, disseminate, and report on it. The information must be authoritative, transparent, and secure.

Figure 1 shows how the Internet could be used to view the web of conservation lands if individual conservation lands were spatially delimited and geo-referenced. The five boxes at the bottom of the figure illustrate the set of distributed servers. As a first step, we are working on connecting the

[1] For more information on the organization, see http://www.opengis.org/.

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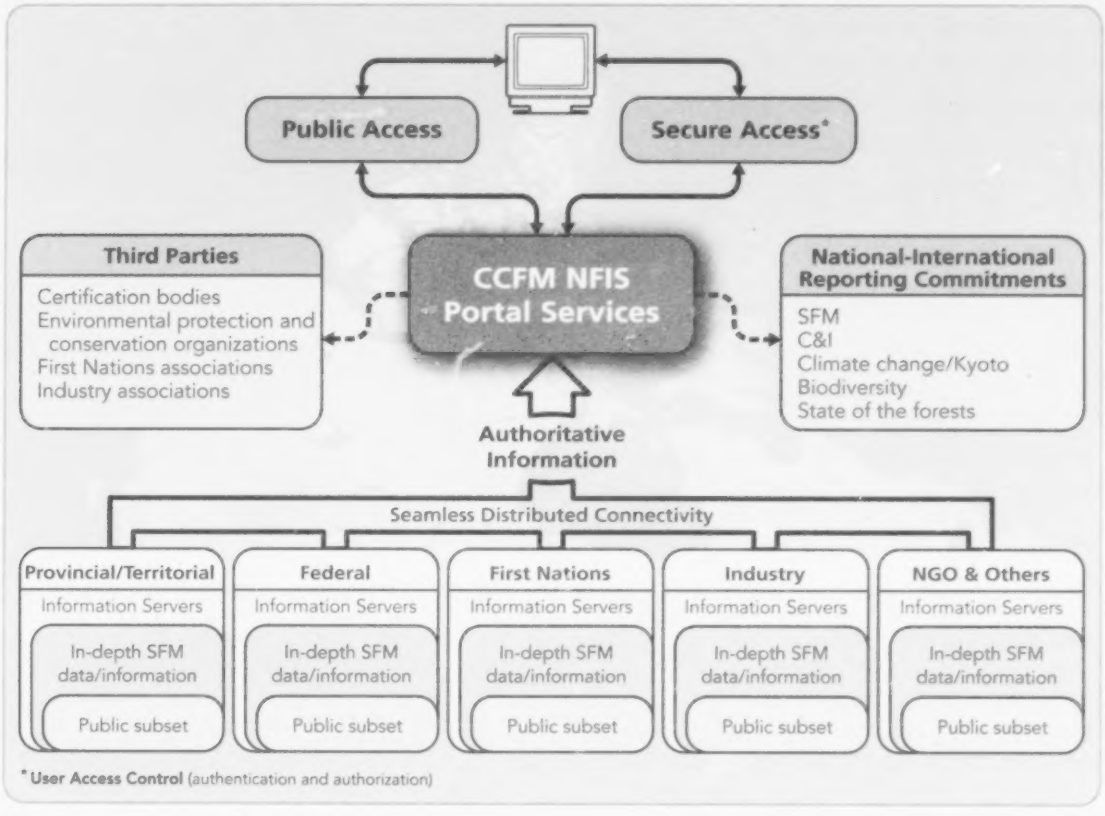

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[1] For more information on this organization, see http://www.opengis.org/

provincial/territorial and the federal servers. Eventually, we will enlist other organizations such as First Nations, industry, and nongovernmental organizations. Because there is no centralized information warehouse, it is up to the custodians of the information stores with the interoperable network to ensure that their information is comprehensive, current, and authoritative. It is possible to enter the system either through public or secure access. The secure access has a distributed access control system that registers and confirms the identity of the person entering. Authentication of identity is controlled by the respective jurisdictions. For example, if I sign on, NRCan authenticates me. If someone from British Columbia signs on, British Columbia authenticates him or her. This feature allows for the provision of two sets of information: one set for international reporting to meet commitments in terms of sustainable forest management, criteria and indicators, climate change, the Kyoto protocol, and biodiversity; the other set for organizations such as nongovernmental ones.

I will briefly describe the user interface for NFIS. There are a number of data stores available to the user. Each of these is an actual distributed server that is in communication as part of NFIS and from which information can be accessed and viewed. The system goes out and interrogates the distributed servers and brings back an image of that information. It also actually brings back the spatial and nonspatial information associated with it, providing a framework by which a user can access and view that information. The interesting feature of this system is that all this can be viewed from a desktop or laptop using a basic browser such as MS Explorer or Netscape. All of the services that NFIS provides, the viewing services, the analysis capabilities, and so on, live on the respective servers of the partners in the network.

In terms of connectivity status in Canada, we have the firewall-protected NFIS project office node at the Pacific Forestry Centre in Victoria. All other CFS forestry centers, Atlantic, Laurentian, Great Lakes, and Northern, also have nodes. In terms of the provinces and territories, British Columbia, Alberta, Ontario, New Brunswick, Nova Scotia, Prince Edward Island, and Newfoundland and Labrador are connected; Saskatchewan and Manitoba are in the process of being connected; Quebec, the Yukon Territory, and the Northwest Territories are in the planning phase; and Nunavut is yet to come on-line. The NFIS is also integrated with the Canadian Geo-science Knowledge Network, which gives earth sciences information, and Environment Canada's Canadian Information System for the Environment (CISE). Work is currently underway for making connections with Agriculture and Agri-food Canada's Land and Water Information System and with Fisheries and Oceans Canada's Ocean Biogeographic Information System.

To summarize, we have put in place a distributed infrastructure that can be used to view, analyze, and disseminate available information from across Canada on the country's forests—their management, cover, ownership and so on.

Importance of Setting Objectives for Biodiversity Conservation

Judy Loo

It is difficult to determine how to address the gaps in the proposed web of conservation lands without first knowing the objective of this approach. If the objective is certification,[2] then this approach may be sufficient, depending on the certification standards used. However, no consistent attempt has been made to establish and monitor progress toward achievement of measurable biodiversity objectives; thus, it is difficult to determine the adequacy of the proposed approach for conserving and maintaining native biodiversity at ecosystem, species, and genetic levels.

Highly protected areas, that is, areas with legally binding, long-term protection specifically for biodiversity, are essential elements of a conservation process because

- forest management practices to attain biodiversity objectives are still in their infancy;
- new information about the relative value of different management practices is generated on an on-going basis; and
- managers do not know how effective many forestry practices are in terms of biodiversity protection. For example, in old-growth forest, is timber removal compatible with protection of all aspects of biodiversity?

Until the impacts of forestry practices are well understood, areas with stringent protection for

[2] Forest certification is a system whereby an independent organization certifies that products originate from sustainably managed forests.

biodiversity need to be set aside as biological reserves and for benchmarking.

Protected areas are, however, often only fragments of the representative land forms that they are meant to protect. Gaps will exist even when the commitment to protecting such areas is high. This does not mean that the entire forest landscape should be protected. Rather, it points to the importance of biodiversity objectives for the lands between protected areas. In addition, protected areas will gradually lose species if they are habitat islands, isolated from other similar habitats.

Special management areas (for instance, riparian areas, deer-wintering yards, and areas where provincial policy requires "soft" forestry practices) exist for a variety of reasons, but are as important for biodiversity conservation as are protected areas. Genetic diversity of commercial forest tree species can be conserved while practicing forest management by allowing natural regeneration on at least a portion of the harvested land. If forest practices are appropriate for the species that naturally inhabit a given site, then special management areas should target species that may not be adapted to the disturbance type created by any widely used harvesting regime. The decision to include special management areas (and areas that for various reasons are excluded from forest harvest) as part of the web of conservation lands should be based on an overall conservation framework with specific biodiversity objectives.

Each element of the web should have its own characteristics and purpose in the conservation framework. For example, a riparian zone, some portion of which is under partial harvest, is a ribbon of forest habitats, streams, and lakes. The characteristic flora and fauna in riparian areas are often rich, providing excellent conservation opportunities. However, many forest ecosystem types are not included in riparian areas.

Lands considered nonproductive and of little economic interest for commercial forestry or where operating would be difficult are generally nutrient-poor and have their own characteristic flora. Although the extent of these lands may be vast, all of Canada's types of forest ecosystems are not necessarily represented. An effective web of conservation lands should include ecosystems and species that would be missed in a system of protected areas.

Finally, I would like to again emphasize the importance of biodiversity objectives. One approach for setting objectives is to use the Canadian Forest Ecosystem Classification (CFEC) as a framework for the web. This national classification is currently being developed by Canadian Forest Service scientists in collaboration with representatives from each province and territory. A starting objective for the web of conservation lands could be to maintain representative examples of all forest ecosystems described in this classification. When CFEC is completed and available for use, it will allow forestry practitioners and conservation scientists to conduct analyses to determine the extent to which Canada's forest ecosystems are included in a web of conservation lands and to identify the gaps.

Feedback

Participants at the side-event and those unable to attend the meeting were given the opportunity to express their opinions on the four discussion questions—the former during question and answer sessions after the presentations, the latter through written submissions. The following is a summary of this feedback.

Discussion Question 1
Does this web of conservation lands provide the necessary foundation to maintain biodiversity at the landscape level?

Strengths

- The approach is a good basis for conservation planning. It recognizes that to be effective, conservation strategies should be implemented in a dynamic landscape context. It provides a framework for a user-friendly management tool.
- The approach is adaptable by countries with large forest land bases.
- It can help forest managers better understand the ecological and economic values of the conservation areas within their jurisdictions, thereby improving the management of these areas and increasing conservation awareness in general.

Challenges

- The data to support implementation of the approach are scarce or non-existent. Forest inventory and growth and yield studies are essential.
- The approach does not take into account global changes nor accommodate large-scale phenomena such as periodic insect outbreaks.
- Implementation of this approach on nonforested (for example, agricultural) and private lands is complex, requiring the collaboration of many stakeholders and levels of government. Land-use planning processes at the provincial and operational scale are not easily integrated in this approach.
- Conservation is more than a numbers game. The proposed approach also needs to focus on spiritual, aesthetic, intellectual, cultural, and ethical values.
- It would be an enormous undertaking to determine what areas are conservation landscapes and to record their size and distribution.
- It is crucial that the approach incorporate well-defined objectives, targets, and gap analyses, as well as an efficient monitoring component to verify that biodiversity is being conserved.
- Riparian zones have no definition nor management standards between or within jurisdictions. Basing conservation on older-growth linear corridors does not have a sound basis in conservation management with the exception of those species specific to this type of habitat.
- A comprehensive plan for biodiversity conservation beyond a collection of ad hoc regulations is needed.

Discussion Question 2
How can forest managers strengthen and benefit from the web of conservation lands?

Strengths

- The approach recognizes outcomes from the efforts of a wide range of stakeholders. As well, it supports conservation efforts outside protected areas and makes stakeholders accountable to the public for ecosystem conservation beyond such areas.
- Information sharing and transparent reporting are fundamental to the approach. Industry's forest management practices to meet biodiversity objectives can thus be better assessed. Successful efforts can be highlighted and change encouraged. A willingness to be open can translate into a better public image, improved share prices, and happier shareholders.
- The approach assists in addressing ecosystem objectives in forest management and in particular is a powerful tool for use in ecosystem reforestation and/or restoration.
- Because the approach considers multiple resource use, it alleviates some concerns that industry may have about resource security.

Challenges

- Currently, there are few incentives for protecting biodiversity.
- Research is needed on trade-offs between timber production and biodiversity conservation.
- The approach does not deal with how information can be accurately reported.
- Easily understandable objectives and best management practices must be incorporated into management plans, particularly regarding connectivity issues.
- A public policy system supporting the approach needs to be developed and put in place.

Discussion Question 3
How does Canada's web of conservation lands approach fit within an international perspective?

Strengths

- The approach is compatible with international criteria and indicator processes and certification systems for sustainable forest management. It is similar to recent European (Forest Reserve Research Network) and Australian initiatives.

Challenges

- Critical migratory routes should be considered and integrated into the approach.
- Because the approach encompasses lands beyond protected areas, certification processes would have to change to include increases in the percentage of area required for conservation activities.
- The approach differs from the IUCN system in two major ways: in the Canadian system, lands outside as well as inside protected areas are considered for conservation purposes and resource exploitation is permitted in some land classifications.

Discussion Question 4
What opportunities exist to address the gaps and extend the vision beyond the forest sector?

Opportunities

- This approach is compatible with a proposed initiative for a contiguous circumpolar intact area of conservation. Canada is in an optimal position to lead this initiative.
- Integration of this approach with provincial land-use planning initiatives is possible. Land-use planning was a fundamental part of the Australian process of creating new conservation reserves. Tools were developed to analyze the trade-offs between conservation and production values. These are potentially available for use in developing Canada's approach to forest conservation lands.
- The approach could be tested with local conservation groups.

Challenges

- There is poor policy alignment between sectors and agencies in most jurisdictions
- Biodiversity information is lacking and monitoring programs have not been developed.

Persons Providing Feedback

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Colette Ansseau, University of Sherbrooke
Claude Barraud, Natural Resources Canada, Canadian Forest Service
Dirk Brinkman, Brinkman and Associates Reforestation Ltd.
Boyd Brown, BC Ministry of Sustainable Resource Management, Skeena Region
William Clarke, Department of Forest Resources and Agriculture, Newfoundland and Labrador
Rod Davis, BC Ministry of Water, Land and Air Protection
Jean Gagnon, Société de la faune et des parcs du Québec
Laura Johnson, University of Victoria
Scott Jones, Ontario Ministry of Natural Resources
Rosa Kouri, Sierra Youth Coalition
Gordon Miller, Environmental Commissioner of Ontario
Liz Osborn, Wildland Nexus
Jacques Perron, Ministère de l'Environnement du Québec
Antonio Righotti, Office fédéral de l'environnement, des forêts et du paysage, Suisse
Tony Rotherham, T. Rotherham Forest Consulting Inc., Quebec
Chris Smith, Ducks Unlimited
John Spence, University of Alberta
Tamara Stark, Greenpeace
Harry Stelfox, Alberta Sustainable Resource Development
Jan Volney, Natural Resources Canada, Canadian Forest Service

Concluding Remarks

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The side event on conservation lands got underway with a brief review of the international conservation situation and of conservation activities in Canada. Participants were reminded of the Millennium Development Goals[1] that emerged from the World Summit for Sustainable Development and which focus on enhancing the quality of people's lives through ensuring environmental sustainability, eradication of extreme poverty, and improved education and health. Although conservation of natural resources is a prerequisite to achieving these goals, sustainable use of natural resources is also part of the response; the key is to find a balance between the needs of people and conservation.

In September 2003, the 5th World Parks Congress, entitled "Benefits beyond Boundaries," recognized the importance of integrating protected areas into the surrounding landscape and of using an ecosystem-based approach to combine adaptive management and economic incentives with conservation and participation of local people. The Millennium Ecosystem Assessment, the United Nations sponsored global assessment of ecosystems and the services they provide, is based on equally weighted environmental, economic, and social bottom lines. Some countries and jurisdictions have already introduced a similar approach in their conservation policies and legislation, bringing the concept to on-the-ground implementation and providing models for sharing experiences.

Panelists and participants at the side event concurred that reserving representative portions of forest ecosystems under some form of "protection" is a fundamental component of any biodiversity conservation strategy and of sustainable forest management. However, studies have shown that the current global network of protected areas is not sufficient to prevent the accelerated extinction of species. Furthermore, it is not possible to make protected areas large or numerous enough to adequately protect biodiversity and sustain ecological integrity over the long term.

A "conservation lands" approach was introduced as part of an enhanced system of classifying current conservation mechanisms. The system provides a framework that uses a common terminology for all conservation activities and captures legislative and policy activities occurring beyond the boundaries of parks and wilderness areas. The utility of this framework for managing, assessing, and reporting on conservation of biodiversity in public and private forests and for demonstrating Canada's commitment to forest conservation was elaborated. Four general criteria for designating conservation lands were identified: representativeness, ecological integrity, connectivity, and management action (governance).

There was general agreement on the importance of the mosaic of areas that collectively maintains biodiversity across a landscape and the linkages between protected and surrounding areas. It was reaffirmed that a conservation landscape is an essential part of any discussion on the future of biodiversity conservation and that key decisions will relate to what is happening outside of the protected areas. The goal is a sustainable land-use matrix to provide a variety of values such as in situ biodiversity conservation, recreation, wilderness, and a sustained flow of goods and services. This land-use matrix would include protected areas, corridors, agricultural areas, industrial forests, and non-industrial forests. Finding a balanced mixture of these land-use options will require trade-offs between social, economic, and environmental values.

With any emerging concept there are gaps and challenges. One of the goals of this event was to identify these challenges and the opportunities to address them. The main observations and recommendations reiterated by panelists and workshop participants are as follows:

- The IUCN protected area categories provide a good starting point for classifying conservation activities within protected areas, but do not cover the full array of conservation mechanisms currently used in forest management in Canada, particularly stewardship activities.
- The proposed conservation lands framework should be compatible with existing classification systems in order to facilitate its implementation.
- Successful attempts in other countries to classify the broad conservation landscape

[1] For more information on the Millennium Development Goals please refer to http://www.un.org/millenniumgoals/

have used two systems, one for protected areas and a complementary system for other lands outside of IUCN categories.

- The criteria for determining whether an area is a conservation land should be clearly defined and easy to apply. Clear guidelines for the recognition of a conservation landscape are required.
- Research is pointing to the importance of assessing biodiversity at the landscape level or forest management unit. Conservation objectives for application at these levels are required.
- To fully report the landscape-level dynamics, the focus of conservation lands must go beyond the forest sector and integrate activities from other communities with interests in these landscapes.
- Reporting on conservation lands requires that information from a variety of landholders and jurisdictional levels be compiled and maintained in an accessible database. Interoperable distributed infrastructures, such as the National Forest Information System, make data sharing and accessibility to modeling and visualization tools possible.

Finally, it was emphasized that development of a classification to capture all of the conservation activities on the landscape is only the first step. A comprehensive plan for biodiversity conservation, incorporating well-defined objectives and targets and a monitoring plan to assess the effectiveness of biodiversity conservation, should follow. Maintaining biological diversity within the context of sustainable use and the other values that must be considered in planning and management operations remains a challenge. An integrated approach to management requires scientific information about many ecological attributes and robust indicators. International criteria and indicators and certification processes were developed in response to the demand for forests to be managed for multiple values and can provide guidance. Nevertheless, how to assess the interrelationship between forest management and the maintenance of biodiversity remains unclear, partly because of a lack of data and appropriate analytical tools.

To bridge this gap and further clarify the conservation landscape concept, the preparation of case studies from candidate conservation landscapes where some monitoring data exist would be a beneficial next step. Proposed classes of conservation lands could be mapped and data collected to examine the occurrence and diversity of forest-dependent species and their requirements for habitat (vegetation structure and composition). In turn, analysis of this information would lead to an improved understanding of the effectiveness of specific management practices in maintaining biodiversity across the landscape and how these practices might be enhanced to meet conservation objectives. The incorporation of information layers on ecosystem functioning or the goods and services derived from the same landscape would further advance understanding of the linkages between thresholds for biodiversity maintenance and the ability of the landscape to sustain the desired range of goods and services. Implementation of such a holistic management framework would also require the development of a governance structure to identify areas of accountability for each stakeholder involved in the process.

The side event stimulated much discussion that has continued long after the World Forestry Congress and led to the forging of partnerships to undertake a project to map conservation lands within forest company operations across the boreal forest. This visualization exercise will test the practicality of the framework for managing, assessing, and reporting on conservation of biodiversity and is a preliminary step towards the eventual production of a status report on the extent and efficacy of conservation lands within Canada's forested landscapes.